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ABSTRACT

Arranged in four sections, the book offers practical techniques for introducing environmental education at the primary level. The first section, on planning, outlines a conceptual framework for environmental education, describes how the staff at one primary school developed a K-7 curriculum, examines an in-service course on environmental science for K-2 teachers and students, discusses an environment week festival, presents environmental guidelines for schools, and suggests ways to develop school grounds for environmental education. The second section focuses on language arts and discusses the relationship between language development and environmental education. Other topics include environmental awareness in contemporary Australian children's books, drama as a means for developing environmental awareness, a curriculum offering about a hypothetical township entitled "Walmit Divided," and the use of videotaped environmental conflict simulations as a teaching tool. Section 3 focuses on the outdoors as a medium for environmental education and describes techniques for heightening student's awareness of their surroundings through the Pilot Environmental Education Project, the Primary Environmental Education Project, and the Urban Field Study Centre. The final section describes a third grade environmental education curriculum and suggests ideas for using community gardening and animals in environmental education activities. (LH)

ED236086

Environmental Education Project

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ENVIRONMENTAL EDUCATION:
A Sourcebook for Primary Education

SP 015 076

Curriculum Development Centre
Canberra Australia

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ABOUT THE ENVIRONMENTAL EDUCATION PROJECT

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Publications

- *Environmental Education: A Sourcebook for Primary Education* (readings and case studies for teachers)
- *Environmental Education: A Sourcebook for Secondary Education* (in five units)
  - I *Planning for Environmental Education*
  - II *Environmental Education in the Humanities*
  - III *Environmental Education in Home Economics and Manual Arts*
  - IV *Environmental Education Using an Interdisciplinary Approach*
  - V *Junior Secondary Outdoor Activities*
- *Exploring Outdoors* (activities for students with teachers notes)
- *Streets* (activities for teachers with students notes)
- *Walmit Divided* (a planning simulation)

Further Information

If you would like further information about other publications from this project or other CDC Projects in the area of environmental education please contact:

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Other CDC Environmental Education Publications

- *Development of Environmental Education in Australia—Key Issues*
- *Education and the Human Environment*
- *Environmental Education for Schools*
- *Habitat: human settlements for the future*
- *Investigating the National Estate*
- *A Report on the Belgrade Conference on Environmental Education*
- *Report of the Curriculum Development Centre Study Group on Environmental Education June 1977.*

FOREWORD

The publications from the Curriculum Development Centre's Environmental Education Project are the result of the developmental work of a number of people around Australia. The project itself was established in 1978 as one of the responses to the recommendations for action proposed by a Study Group on Environmental Education sponsored by the Centre. A Project Director was made available on secondment from the Education Department of South Australia, and all other States and Territories nominated a Liaison Officer to be responsible for the project's network activities. The co-operative nature of the project is further demonstrated by the involvement of a lecturer from a teacher training institution and a nominee from the Australian Teachers Federation on the Advisory Committee.

The materials themselves were developed by teachers to whom small-scale grants were made for the description of activities which contribute to the Centre's view of environmental education. This view, which is the basis of all CDC projects in this program area, is stated as more than just developing knowledge about the environment and skills to investigate it. Environmental education involves developing a concern for the environment, developing a willingness to take responsible action to improve the quality of life, and accepting responsibility for environmental management. Although some of the papers in this volume may not reflect all of these aims, they do illustrate the range of activities that are being undertaken in Australian schools in the name of environmental education and thus they fulfil one of the aims of the project.

In addition to the grant materials, some commissioned accounts were arranged. The resulting descriptions and analyses of activities passed through a range of trialling, vetting and editing services which involved teachers, the Advisory Committee, the State Liaison Officer network and the management procedures convened by the Centre. Thus the materials have been developed in response to classroom needs and with a view to bringing about qualitative improvement to learning in environmental education through the provision of trialled and modified resources. They are in the tradition of the Social Education Materials Project (SEMP)—among which there are some related materials—and they have strong associations with the recently published resources on *Investigating the National Estate*.

We hope that teachers around Australia will find the Environmental Education Project materials useful directly in their classrooms and as exemplars for adaptation to their local situation.

M. SKILBECK
Director

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AN INTRODUCTION TO THIS VOLUME

This set of readings and case studies is one of a series of publications resulting from the Centre's *Environmental Education Project*.

The materials in this volume have been written by teachers and curriculum consultants around Australia. Most of the papers describe the teachers' own programs. Others describe the author's position or point of view on his or her particular topic.

The materials have been grouped into four sections. In the *Planning* section, Annette Greenall (from the Curriculum Development Centre) gives an introduction to environmental education, David Stokes (from State College of Victoria—Rusden) and Jon Womersley (formerly of the Department of Environment, Housing and Community Development) outline a *Conceptual Framework* for environmental education. Alan Weymouth (from Paracombe Primary School, S.A.) and David Prideaux (from Hartley CAE) describe how the staff at Paracombe Primary School developed their *K-7 curriculum* based on the ethic of improving environmental quality. Dorothy Pearson describes an in-school in-service course on *Environmental Science* for K-2 teachers and students.

Another way of approaching environmental education in a school is described by John Stirling (from Princes Hill High School, Victoria) who organised an *Environment Week festival* for his school.

School buildings and grounds are important considerations in planning environmental education policies. Andrew Tidswell gives some *Guidelines for Schools* and John Smith and Jim Wilson outline a number of ways of *Developing School Grounds*.

The *Language Arts* are important for describing and communicating ideas and feelings about the environment. Bernie Higgs (from Western Australia) describes the relationship between *Language Development and Environmental Education*. Anne Hazell (from South Australia) examines *Environmental Awareness in Contemporary Australian Children's Books*. David Taylor and Dennis Gill (from the Drama Resources Centre, Victoria) introduce role-play as a technique for *Drama and the Environment*. Tony Strutton follows this idea with his videotape *Imagination and the Environment* and Jim Mitchell and John Walker use similar techniques in their planning simulation *Walmit Divided*.

The *Outdoors* is usually identified with environmental education and although it is not the only place environmental education can occur it is an important one. Bob Stevenson describes some techniques for heightening students' awareness of their surroundings with the *Pilot Environmental Education Project*. Two units of the Kuring-gai CAE *Primary Environmental Education Project* are included to illustrate other ways of using your local area and the Fortitude Valley *Urban Field Study Centre* is described to illustrate how a city and its streets can be used for environmental education.

Living Things can be used in the classroom to develop a wide range of learning skills. Ron Tooth describes his approach at the *Year 3 level*. Audrey Windrum has described how *community gardening* can be used. David Riordan and Maitland Pearson (from the Royal Melbourne Zoo Education Service) give examples of how *animals* can be used in activities for *all curriculum areas*.

Other primary level materials for teachers and students in the area of environmental education from this project are being made available separately. These are *Exploring Outdoors*, *Streets* and *Walmit Divided*.

AN INTRODUCTION TO ENVIRONMENTAL EDUCATION

Annette Greenall

This introduction has three aims—to examine the meaning of environmental education and its aims, to look at how environmental education has evolved in Australian school curricula and to give a brief history of Curriculum Development Centre involvement in environmental education.

What is environmental education?

The definition put forward ten years ago by the International Union for the Conservation of Nature and Natural Resources is still relevant:

> Environmental education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulating of a code of behaviour about issues concerning environmental quality.[1]

This definition indicates that environmental education is much more than teaching about the environment, in the environment or from the environment. Environmental education is concerned with developing attitudes, providing opportunities for practice in decision making and making informed decisions about the environment.

The aims of the environmental education have been refined at successive international meetings and early in 1980 the Curriculum Development Centre included the following set of aims in its document *Environmental Education for Schools.*[2]

- to help students acquire an *awareness* of and *sensitivity* to the total environment
- to help students develop a basic *understanding* of the total environment and the inter-relationships of man and the environment
- to help students develop the *skills* necessary for investigating the total environment and for identifying and solving environmental problems
- to help students acquire social values and strong *feelings of concern* for the environment
- to help students acquire the *motivation for actively participating* in environmental improvement and protection
- to help students *identify alternative approaches* and *make informed* decisions about the environment based on ecological, political, economic, social and aesthetic factors
- to provide students with *opportunities to be actively involved* at all levels in working towards the resolution of environmental problems

These aims cannot be achieved through any one subject or discipline area. Rather, their achievement will involve all students and all subject areas at all levels. *Environmental education is an orientation in the curriculum* or 'the impregnation of our education by the subject matter, principles, methods and spirit of environmental education'.

We can talk about education *in* the environment, education *about* the environment, education *from* the environment and education *for* the environment, but only the last can be called environmental education.

Education *in* the environment can take the form of the environment as a classroom location or—through discipline studies such as history, geography, art, science, drama, music, mathematics—the environment can be the place where knowledge about the skills to investigate the environment can be acquired, feelings of concern for the environment can be developed, and active participation in environmental improvement and protection can take place.

Education *about* the environment seeks to discover the nature of a study area mainly in the form of knowledge (information) about the particular environment.

Education *from* the environment uses the environment as a resource either as something to

be investigated where inquiry skills are developed or as a source of material for realistic activities in language, history, science, mathematics, craft and other subject areas.

Education *for* the environment seeks to develop student's informed concern for, and responsibility towards, the environment through activities aimed at developing values which affect behaviour and lead to the development of a personal environmental ethic. Education for the environment involves educating students so that their actions and influence on collective community action will be positively for the benefit of the environment.

Education about, from and for the environment can take place within the school classroom or outdoors, around the school buildings, in the school grounds or local area, at shopping centres or historic buildings, at the beach or river, or 'in the wild'. Education about and from the environment involves the acquisition of knowledge and the development of skills which are important bases for environmental education—but it is only when education *for* the environment is the intention that environmental education is actually taking place and the aims given above have a possibility of being achieved.

Environmental education is more than just developing knowledge about the environment and skills to investigate the environment. Environmental education involves developing a concern for the environment, developing a willingness to take responsible action to improve the quality of life, and accepting responsibility for environmental management.

Environmental education in Australian schools

Environmental education in Australian schools could be said to have its origins in nature study in primary schools, in ecology and geography feed studies in secondary schools and through the school camps movement. Allen Strom has recently given his viewpoint on this development in New South Wales[3] as has Alan Reid for Victoria.[4]

During the seventies, as part of the growth of social studies in schools, the growing awareness of science in society, and the realisation of the importance of studying local history and geography, environmental studies of various forms came to be part of the curriculum in many Australian schools. Many of these programs have been more concerned with education in the environment (experiences outside the classroom) or increasing the amount of teaching about the environment (the environmental content of programs) than with involving students in social action and decision making programs but the overall aim has been with increasing the general awareness of our surroundings and our interrelationships with them.

The environmental component of science programs has, until recently, been mainly concerned with teaching about the environment and the interrelationships within it rather than with developing concern for the environment. Fensham and May have argued for environmental education as an aim of core curriculum and have related this to science education with an emphasis on education for the environment.[5] (Environmental studies is one of the nine essential areas of knowledge and experience in the Curriculum Development Centre's core curriculum document *Core Curriculum for Australian Schools*.[6] This is discussed in greater detail below.)

Geography, because of its emphasis on man-land relationships has been well placed to handle this part of environmental education. Social studies are involved in environmental education through values education and the study of social issues. Drama has a role in environmental education in raising environmental consciousness through role-playing activities.

One of the aims of the CDC's Environmental Education Project has been to support the development of some position papers and descriptive evaluations of various types of environmental education occurring in Australian schools. These were envisaged as including whole school and year long programs, examples of community involvement programs, field excursions, environmental problem projects, urban trails and classroom programs. Examples of many of these are included in this volume and although many of the articles describe programs or activities that have an education in or about the environment component most have the potential for becoming education for the environment and thus working towards achieving the aims of environmental education.

Environmental Education at the Curriculum Development Centre

Environmental education has been a priority area for the CDC since its inception in 1973. The issue was to determine the sort of assistance that was needed for the development of environmental education in Australian schools.

The growing world wide concern about the environmental crisis in the late sixties stimulated the Australian Academy of Science to convene a national conference in April 1970 on the theme 'Education and the Environmental Crisis'.[7] At this time there were some conservation education programs in primary schools in each State but no

specific programs for environmental education in secondary schools or teacher training courses.

In 1973-74 Linke[8] reviewed some of the major developments in environmental education in Australia and overseas. Although there were activities underway that could be called environmental education he concluded that there was a lack of co-ordination among the many institutions and agencies involved in different aspects of environmental education.

At this time Reid was also surveying the environmental education scene as part of his study of opportunities for Australian Government involvement in environmental education.[9] In his report he suggested that the Government could develop a national plan, a resource centre services by State and Commonwealth instrumentalities, and a regional network of centres staffed by schools' and community co-ordinators.

These reports, together with a CDC 'Survey of Needs for Environmental Education in Australia'[10] formed the background for the CDC Environmental Education Committee which was established in late 1974 under the chairmanship of Russell Linke. The interim report from this Committee was discussed at the 1975 Australian National Commission for Unesco Seminar on Education and the Human Environist.[11]

Although not acted upon, the report of this Committee did provide an essential base for the deliberations of the CDC Study Group on Environmental Education which was established late in 1976 under the chairmanship of Peter Fensham. It is the recommendations from this Committee[12] which form the basis of the CDC's environmental education program.

Environmental Education for Schools,[13] a set of a booklet and two posters, was a joint project between CDC and the Department of Environment, Housing and Community Development (now Department of Science and the Environment) to encourage the general acceptance of the place and significance of education concerning the environment and some of its general features by teachers in many different types of classrooms.

Investigating the National Estate,[14] a kit of resource materials on Australia's heritage, was a joint project of CDC and the Australian Heritage Commission which aimed to heighten awareness of Australia's heritage, suggest criteria for deciding what should be part of our heritage, and to assist in the development of skills for identifying what should be on the Register of the National Estate.

The third component of the program was this Environmental Education Project. This project has resulted in the development of a number of articles and manuscripts which are being published by the CDC for primary and secondary school teachers during 1980 and 1981.

The Future

The future challenge for environmental education at the Curriculum Development Centre is in relation to the core curriculum. As mentioned earlier, environmental studies is one of the nine areas of the core curriculum outlined by the Centre. The central purpose of environmental studies within the core is awareness and understanding of both the physical and man-made environments and sensitivity to the forces that sustain or may destroy them. This requires both systematic knowledge drawn from such disciplines as biology, geography, landscape architecture, economics, etc., and a readiness by schools to participate in environmental maintenance projects which give students practical experience in the field. As in other areas of the core, there is an emphasis on social action—environmental studies represents a blend of theory and practice which may be organised in many different ways. Within the core, what is important is not the particular kind of organisation, but the environmentalist approach or perspective. This is an amalgam of types of knowledge and understanding, and a disposition to sustain and protect the environment.[15]

As described in this paragraph, environmental education is interpreted as being an environmentalist approach or perspective across the curriculum, involving education in, about and for the environment. Indeed, social action is seen as an important part of the area.

The core learning processes are closely related to environmental education.[16] Learning and thinking techniques such as problem-solving, lateral thinking, systematic recording of data, reaching decisions and making judgments are an important part of environmental education. The development of interpersonal and group relationships through group work and field trips; practical performances; using a variety of forms of expression; developing skills and abilities—such as reading, elementary statistics, use of tools and organising and completing learning tasks—and developing dispositions and values such as regard for others are also important components of environmental education.

Thus the environmental studies area of the core curriculum together with the core learning processes, is concerned with meeting all the aims for environmental education noted earlier. The challenge is to relate these aims to the core curriculum and its implementation at all levels in Australian schools. Some of the following papers may help provide guidelines for this development.

Notes

1. IUCN definition cited in Carson, S.McB. *Environmental Studies: the Construction of an 'A' level Syllabus*, NFER, Slough, U.K., 1971, page 78.
2. Greenall, A. *Environmental Education for Schools*, Curriculum Development Centre, Canberra, 1980.
3. Strom, A. A. 'The Development of Environmental Education', *Australian Association for Environmental Education Newsletter 2* (July 1980), pp. 4-5.
4. Reid, A. J. 'The Essence of Environmental Education', *Australian Association for Environmental Education Newsletter 1* (April 1980), pp. 3-6.
5. Fensham, P. J. & May, J. B. 'Servant not Master—A New Role for Science in a Core of Environmental Education', *Australian Science Teachers Journal 25*, 2 (1979), pp. 15-24.
6. Curriculum Development Centre *Core Curriculum for Australian Schools*, Curriculum Development Centre, Canberra, 1980.
7. Evans, J. & Boyden, S. (eds), *Education and the Environmental Crisis*, Australian Academy of Science, Canberra, 1970.
8. Linke, R. D. *Environmental Education in Australia*, Allen and Unwin, Sydney, 1980.
9. Reid, A. J., *A Preliminary Study of Opportunities for Australian Government Involvement in Environmental Education in Australia*, report submitted to the Australian Minister for the Environment and Conservation, Canberra, June 1974.
10. See Greenall, A. E., and Womersley, J. C. (eds), *Development of Environmental Education in Australia—Key Issues*, Curriculum Development Centre, Canberra, 1977.
11. Linke, R. D., (ed.), *Education and the Human Environment*—Unesco Seminar Report, Curriculum Development Centre, Canberra, 1977.
12. *Report of the Curriculum Development Centre Study Group on Environmental Education*, Curriculum Development Centre, Canberra, 1977.
13. Greenall, 1980.
14. *Investigating the National Estate*, Curriculum Development Centre, Canberra, 1980
15. Curriculum Development Centre, 1980, p. 18.
16. Curriculum Development Centre, 1980, p. 16.

SECTION

1

PLANNING

ENVIRONMENTAL EDUCATION: A CONCEPTUAL FRAMEWORK

Jon Womersley
David Stokes

PREAMBLE

After briefly outlining the history and purpose of environmental education the authors outline a conceptual framework by which the aims, objectives and guiding principles of environmental education can be translated into an effective teaching/learning program. The three dimensions of the framework—*objectives, content* and *learning situations*—are discussed in detail by focusing on the questions 'What is the content of environmental education?' and 'How should that content be organised?'. Answers to these questions identify the major issues of classroom management. The subsidiary questions 'Is environmental education different?' and 'Who should teach it?' raise questions concerning the relationship of environmental education within the total curriculum, and identify aspects of school administration that need to be considered if valid programs of environmental education are to be implemented. Underlying all aspects of the paper is the authors' strongly held view that environmental education is a process of thinking and knowing about the world around us and so is concerned with awareness and knowledge of the environment, the development of attitudes towards it and skills to appreciate and understand it, and with being involved at all levels in its improvement and protection. This view, in varying degree, is shared by all other contributors to this handbook.

Teaching about, in and for the environment varies widely and reflects the many attitudes towards and understanding of both environment and education. If we are to clarify our understanding of the significance and purpose of this particular form of educational activity, then it is important to know where it began and what it is today.

HISTORICAL PERSPECTIVE

The concept of environment has its modern origins in the nineteenth century. This was the period when industrialisation brought about an unprecedented alienation of man from nature. It was also the period when the world's thinkers and scholars began to introduce new ideas born out of a deeper understanding of the world around them. For example, Charles Darwin's book on the *Origin of Species* (1859), proposed a non-theistic view of how all living things are the product of the environment working through the processes of natural selection. This view affected our understanding of both the environment and education. Ernst Haeckel (1834-1919), who was strongly influenced by Darwin's work, introduced the word *ecology* to describe the emerging new ideas about the relationships between living organisms and their bio-physical surroundings (Wasmann, 1910). Nearly a century later this word became the slogan of the conservation and environment movements.

Industrialisation brought with it the spread of a manufactured environment consisting of iron, glass and brick, fuelled by coal and human

sweat, propelled by steam, and at a scale previously unknown. Human dignity and welfare were trampled in the rush for production, and nineteenth century England became one of the first countries to experience urban environmental problems of modern proportions. Control of nature and 'progress' were extolled as the virtues of the age but this spread of human dominance in the environment was not without its critics.

Among these was Patrick Geddes (1854-1933), a professor of botany, and a student of sociology. Geddes worked in Edinburgh, Scotland, where he opened the now famous educational establishment 'The Outlook Tower' in 1889. As he saw a close connection between the quality of education and the quality of the environment, he argued that a child who was placed in touch with the profound realities of its environment would, in all probability, develop a creative attitude to its surrounds. For Geddes, the human habitat resulted from an interaction between location, people and work: a trinity which came together in an environmental philosophy which he expressed in new approaches to civic design and regional planning. For many people, Patrick Geddes is the founding father of environmental education (Wheeler, 1970).

Changes in attitudes towards the environment were complemented by changing ideas about education. Taking as his starting point John Locke's *Essay Concerning Human Understanding* (1690), Watts (1969) identifies three main strands in the development of the environmental idea in education. The first strand is epistemological and Watts traces its development through thinkers and educators such as Herbart, William James and J. E. Adamson. More recently the empiricist view of knowledge has been developed by Piaget with his emphasis on concrete situations and continuous interaction between learners and their environment.

The second strand is philosophical and Watts sees this emerging from the work of Kant and Hegel in developing the 'idealist' thesis. Idealism was the most widely accepted philosophic attitude of the nineteenth century and the view that accumulation of experience from the environment was a necessary principle of human development had far reaching effects on education. By the late-nineteenth century John Dewey's pragmatist ideas (idealism modified in a more scientific form by the removal of the absolute or purpose) had further reinforced the experiential idea, although he did not confine his view to the concentration on local familiar environments. To him these were only the beginning, a means to explore the world beyond the child's everyday experience. Dewey's main concern was the relationship between education and society and as such he might be regarded as an advocate of social rather than environmental education.

The third strand is naturalism, greatly publicised by Rousseau in his *Emile*, and in the view of Watts an indication of the conservatism of modern progressive education. It was in the tradition of naturalism that Pestalozzi developed a theory of instruction involving observation and self-guided practice in the environment. In England the emergence of the tradition of naturalism occurred not so much in education as in cultural-aesthetic form, seen most readily in the poetry of William Wordsworth. The view that there was a cruel and destructive science which destroyed natural beauty and a humane science which took the form of observations of flora and fauna in an undisturbed environment emerged from his poetry. According to Watts, naturalist philosophy was a remarkably apt basis for educational doctrine in both England and America, because it spanned social classes and was highly adaptable. Naturalism provided environmental study with popular appeal and this was underpinned for the more scholarly by the work of Herbart, Froebel and Pestalozzi. So strong was this influence that Watts concluded his discussion:

> The naturalist element remains a mainspring of the environmental studies movement. During the 1960's the noble savages of the secondary schools have scrambled over the fells, and their field-studies centres steadily encroach on the Juan Fernandez of English romanticism, the Cumbrian Lake District (Watts, 1969).

The recent past has produced much more rapid change and action. The first half of the twentieth century witnessed the steady development of environmental consciousness. This can be seen in the implementation of the North American Migratory Birds Treaty of 1916, the emergence in the late 1940s of the International Union for the Conservation of Nature and Natural Resources (IUCN), and the creation in 1933 of the Tennessee Valley Authority whose approach to river basin management has found application around the world. In this same period, effective and important books on environmental matters such as *The Rape of the Earth: A World Survey of Soil Erosion* (1939) by G. V. Jacks and R. O. Whyte and *Sand County Almanac* (1948) by Aldo Leopold were produced. Books such as these did much to spur on the development of environmental consciousness. By the 1960s however, the

gentlemanly pursuit of sound environmental goals was being replaced by an outcry that mankind was facing imminent disaster. Rachel Carson wrote a well-informed and devastating indictment of the indiscriminate use of pesticides in her book *Silent Spring* (1962) and stimulated great concern about the environment. The destruction of the Torrey Canyon in 1967 when it ran onto rocks near the English coast caused what was at that time the world's largest single oil slick. This inflicted great injury to the tourist and holiday industry as well as incalculable damage to the natural environment.

These kinds of events, and they were not the only ones, served to highlight man's relationships with the environment and a much more vigorous concern was to be seen and heard by the 1970s. The launching of the magazine *Ecologist*, in 1970, the publication of books such as *Population, Resources and Environment* (1970) by Ehrlich and Ehrlich, and *Science and Survival* (1970) by Commoner, were just the tip of an information revolution. The emergence of new organisations such as the Club of Rome and Friends of the Earth were symptomatic of the widespread concern about the environment and its future management. In response to this concern, new government agencies were created with responsibilities for regulation and control. Max Nicholson, the former Director-General of the Nature Conservancy, observed in 1970 'that the one thing in the world which is invincible is an idea whose time has come. Such an idea, in these days is the care of man's environment, or in a word conservation' (Nicholson, 1970). As with any widespread social concern, these new attitudes to the environment and education was emerging: no longer the rather neutral, naturalist practice of nature or field studies, but the committed activism of the kind envisaged by Patrick Geddes.

All the strands of thought and events which have influenced the development of environmental education cannot be given justice in this introduction. However, the essential element is that environmental education has well developed historical and philosophical foundations. As we formulate current programs and plans for the future, it is important to look back and try to understand the roots from which those seemingly new and reactionary ideas have grown. Then their apparent radical and reactionary image can be seen, in truth, to be conservative and moderate: a far more acceptable basis on which to launch new curriculum projects.

ENVIRONMENTAL EDUCATION AS PART OF THE CURRICULUM

Environmental education is a process which is applicable to everyone and so should be directed at people of all ages. Its purpose is to produce an environmentally literate citizenry who will have the basic knowledge of and concern for the environment, awareness of the implications of issues, basic skills to cope with issues and initiate solutions, as well as motivation and commitment to the measures of environmental management.

At the school level in Australia we are concerned with a broad process which involves the development of awareness, knowledge, skills and attitudes which assist learners to understand the relationships between people and their surroundings. This process also involves the development of concern for the well-being of these relationships, making decisions and taking responsible action to improve the quality of life, and accepting both individual and group responsibility for environmental management. It can be developed through all the traditional subject areas of the school curriculum.

While environmental education can be developed throughout the school curriculum in many different subject areas, it is not without direction and purpose. As with other areas of educational endeavour the aims, objectives and guiding principles of environmental education have been distilled over many years. Those used here have been drawn from the recommendations of the Intergovernmental Conference on Environmental Education held in 1977 and have been adapted so that they apply specifically to the school level. They are included here not because they are immutable but because they provide an essential basis on which to build curricula in environmental education.

The *aims* of environmental education are:

- to foster awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- to provide every person with opportunities to acquire knowledge, values, attitudes, commitment and skills to protect and improve the environment;
- to create new patterns of behaviour of individuals, groups and societies towards the environment.

The *objectives* of environmental education are:

Awareness —To help learners acquire an

awareness of and sensitivity to the total environment.

Knowledge —To help learners gain a variety of experience in, and acquire a basic understanding of the environment.

Attitudes —To help learners acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection.

Skills —To help learners acquire the skills for identifying and understanding environmental issues and participating in environmental improvement and protection.

Participation —To provide learners with an opportunity to be actively involved at all levels in environment improvement and protection.

Some *guiding principles* for environmental education:

- Environmental education should consider the environment in its totality: natural and built, technological and social dimensions.
- Environmental education should draw on the specific content of each discipline in order to construct an holistic and balanced perspective.
- Environmental education should utilise diverse learning environments and a broad array of educational approaches to teaching/learning about, in and for the environment with due stress on practical activities and first-hand experience.
- Environmental education should relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on the learner's own community in early years.
- Environmental education should examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas.
- Environmental education should emphasise the complexity of environmental improvement and protection and thus the need to develop critical thinking and problem-solving skills.
- Environmental education should promote the value and necessity of local, national and international co-operation in the prevention and solution of environmental problems.
- Environmental education should enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences.

This then is the basis on which curricula in environmental education have to be built.

A CONCEPTUAL FRAMEWORK FOR ENVIRONMENTAL EDUCATION

The aims, objectives and guiding principles of environmental education provide the rationale from which an appropriate conceptual framework can be derived. The term 'conceptual framework' may appear very academic and therefore off-putting but it is simply a means of organising ideas around which a program of environmental education can be developed. In this particular case, we are presenting a framework which has three dimensions which for simplicity, we have called *objectives*, *content* and *learning situations*. These dimensions are represented diagrammatically in Figure 1 and are discussed in detail below.

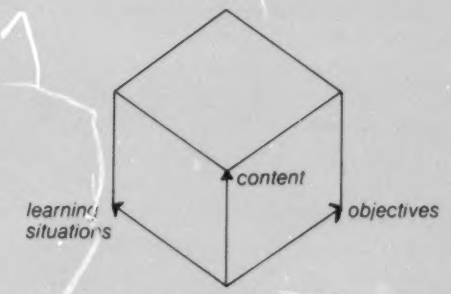

FIG. 1: A *Conceptual Framework for Environmental Education*

OBJECTIVES

The objectives of environmental education—awareness, knowledge, attitudes, skills and participation—are the horizontal dimensions in the conceptual framework and determine whether a program constitutes environmental education or some other form of education.

CONTENT

The content dimension of the framework is one of the most vexed areas of discussion in environmental education because two important questions are involved: 'What is the content of

environmental education?' and 'How should the content be organised?' These questions lead to other questions. For example: Is environmental education a discipline or does it draw from many disciplines? If it draws from many disciplines then which is to be most important and therefore to be granted most time in the program?

There is, of course, no correct answer so what we have done is to isolate sets of concepts which we believe identify the content of environmental education and which will assist teachers in their development of a balanced program. The concepts which encompass the content of environmental education include:

BIOPHYSICAL

- Living things are interdependent with one another and with their environment.
- Green plants are the ultimate sources of food, clothing, shelter and energy in most societies.
- An organism is the product of its heredity and environment.
- In any environment, one component (space, water, air, shelter or food) may become a limiting factor.
  The natural environment is irreplaceable.

SOCIO-CULTURAL

- The culture of a group is its learned behaviour in the form of customs, habits, attitudes, institutions and lifestyles that are transmitted to its progeny.
- The relationships between man and the natural environment are mediated by his culture.
- Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government and the arts.

MANAGEMENT

- The management of natural resources to meet the needs of successive generations demands long-range planning.
- Family planning and the limiting of family size are important if overpopulation is to be avoided and a reasonable standard of living assured for future generations.
- Environmental management involves the application of knowledge in a rational direction to achieve a particular objective or objectives.

CHANGE

- Organisms and environments are constantly changing.
- The rate of change in an environment may exceed the rate of organism adaptation.
- All living things including man are continually evolving.
- Man has accelerated the rate of change.
- Increasing human populations, rising living standards, and the resultant demands for greater industrial and agricultural productivity can promote increasing environmental contamination.

ORGANISING THE CONTENT

The content of a program of environmental education can be organised in many ways. Four possible approaches are outlined here. They are not definitive and are meant only to serve as a guide to the developer of an environmental education program. You may wish to use more than one approach at different times, or you may choose one as the main approach and supplement it with one or more of the others. Whichever approach you choose, the selection of content should be guided by the basic concepts which undergird all environmental education.

Approach 1: Organising Through Disciplines or Subjects

Sections of the content of an environmental education program may be clearly associated with a particular discipline or subject in the existing curriculum. In these circumstances responsibility for different aspects of the content of the program may be taken by different teachers with specialist knowledge or experience. For example the chosen content may focus on the chemical pollution of an urban waterway. Chemistry can contribute to an understanding of the pollutants and the chemical characteristics of the waterway. Biology can contribute to an understanding of the natural flora and fauna and the impact of pollutants on the physiology of these populations, geography to land use patterns, drainage patterns and climatology, all of which may lead to a concentration of pollutants in the waterway, history and social science to temporal and human perspectives, literature and music can provide avenues for expression using poetry, letters, dialogue and other forms.

To merely teach the content of environmental education through the disciplines, however, will not constitute a program of environmental

education. The content must be taught with the objectives of environmental education in mind. This will place emphasis in the learning process on appropriate skills, attitudes, awareness and participation in addition to knowledge of the issue or area of study.

Approach 2: Organising Through the Concepts

The basic concepts could be organised into a balanced environmental education program. Environmental education has an underlying philosophy which can be briefly expressed in the term 'earthmanship'. Earthmanship is derived from the idea of stewardship and involves the perception of environmental improvement and management as a complex mix of physical, social, political and economic factors. Everything is connected to everything and mankind's task is to retain the stability, complexity and diversity.

In an appropriate learning situation and with the objectives of environmental education in mind teachers could take the basic content concepts and develop a unit or subject for one level or for several levels of the school curriculum.

Approach 3: Organising Through Case Studies

Real world situations are chosen and investigated using whatever methods are appropriate to the particular issues or case study. The real world as represented in the Press, on radio and television, in the local community, nationally or internationally provides a wide and varied stimulus for environmental education programs. For example, the announcement that a local council was going to clear a small urban park and build a football field for the local school could provide a focus for the study of:

- *An inventory of the plants and animals currently found in the park.*

  In carrying out the inventory, the students will be able to identify plants and animals using direct and indirect methods, use sampling techniques, prepare species lists, examine historical records to determine the origins of flora and fauna, examine the niches of species found, etc.

- *The status of the park.*

  Students will be able to examine the origins of the park; how the park came into being; and explore questions like the following: is the park a remnant of native bushland or is it composed of introduced species, are the species rare or common; does the park provide important habitats, does the park represent an urban refuge or is it a source of vermin and noxious weeds? Economic considerations of who currently pays, and how much do they pay to keep the park as it is compared with the costs involved in the alternative plan could be examined.

- *Users of the park in its present form compared with those for the proposed development.*

  Students could identify the types of users, the age of users, the time of day or week the park is currently used compared with the proposed usage. The students could examine whether the local community requires parks or football fields in terms of current facilities and usage patterns. Students could examine how people currently get to the park compared with how they will get to the football field. Studies could include traffic flows, car and bus parking requirements, noise levels, facilities etc. Perhaps different cultural perceptions of various kinds of parks and changing needs of communities could be examined.

- *Collation of a report which displays the key aspects of the two alternatives and the reason why one of these alternatives is being supported.*

  This task could be viewed as a sophisticated exercise in communication in which the talents of the students in writing, graphic communication and the display of their findings will be required to evaluate the strengths and weaknesses of the alternative land uses and to make a series of recommendations based on that evaluation.

- *Individual or collective action which may be taken to influence the local council.*

  If the final decision has yet to be made, then the presentation of the report to the local council meeting could be the outcome of this study. If the decision to build the football field has been taken, then group visits to the council chamber to study procedures and to talk with individual councillors or public figures may be required before the report is presented.

In using a case study such as the one described as a focus, the objectives of environmental education can be fully implemented. In this case study an *awareness* of the problems confronting people and the ways in which

decisions about the environment are made have been introduced. *Knowledge* from existing subjects such as biology, geography, economics, mathematics and English, has been used. The students will begin to understand how attitudes can be changed. The study is one which involves *participation* in a student-teacher group both during the study and during the finalisation and presentation of the report. The *skills* which have been used are partly the skills from the disciplines but also the newly acquired skills of communication, co-operation, the synthesis of many separate pieces of information, and skills of problem definition and problem solving.

This is just one example and the real world of learners is full of many more. It is worth noting that learners will learn more readily and with enthusiasm and interest when they are actively involved in deciding what issues or case studies are to be investigated and in helping to gather the data which contribute to the investigation. It is more likely by this that the pitfalls of selecting content which bears little relationship to the real life experiences of the learners will be avoided. Nevertheless, it is also important that learners are guided into choosing new experiences so that they develop a well-rounded perception and understanding of the environment.

Approach 4: Organising Through Processes

Two of the major processes in environmental education are problem-solving and values clarification. Either of these processes when combined with the objectives of environmental education and an appropriate learning situation can be a valuable tool for organising content.

Stapp (1974) has said that there are seven recommended steps in the problem solving process. These are:

- identifying and defining the environmental issues;
- collecting, organising and analysing data related to the issues;
- generating and evaluating alternative solutions;
- evaluating the alternatives and selecting the best solution generated;
- developing a plan of action;
- implementing a plan of action;
- evaluating the implementation process.

The development of skills in problem definition, data collection, organisating and analysing, generating alternative solutions, evaluating and selecting alternative solutions, and developing, implementing and evaluating action plans are key elements in environmental education.

Community problem solving also provides the opportunity to focus on values clarification. Values clarification procedures place emphasis on the process of valuing and not on the transmission of any right or absolute set of values (Simon *et al.*, 1972). As such, values clarification is of paramount importance in making rational environmental decisions, and must be a basic part of every environmental education program. Stapp (1974) has suggested that there are five steps in the values clarification process. These are:

- students and teachers identify an issue;
- students suggest alternative solutions;
- students consider the consequences of each alternative;
- students express their feelings about each alternative;
- students make a free choice.

This process helps learners become aware of personal beliefs, attitudes, values and behaviours which they prize and are committed to both in and out of the classroom. An important part of the teachers' role in this process is to help learners consider whether their stated beliefs, attitudes and values are congruent with their actions. By considering alternatives, the consequences of alternatives and their own personal feelings toward each alternative, learners begin to refine and develop their own set of values.

As organising ideas, problem solving and values clarification can be combined readily with an approach through case studies. For example, an environmental education program may involve the investigation of solutions for local community issues. This could comprise a series of 'environmental encounters' which relate to all the year levels and subjects available in a school. In the lower years there should be an attempt to bring about basic awareness and appreciation. While recognition and solution of relevant issues is appropriate, the honing of problem-solving skills should be left for the later years. Each encounter could be documented and placed on a punch card index so that a useful environmental education resource is developed over time. Teachers could then extract environmental encounters appropriate to a particular discipline, concept or problem area, use them as previously or modify them to meet the needs of their particular group of learners and program.

Learning Situations

Environmental education is not the sole preserve of any one subject or discipline and it is not confined within the four walls of a classroom. The objectives of environmental education suggest that it is something which recognises natural rhythms and times and takes place in the environment which is the subject of investigation. This is not to say that an environmental education program is not limited by the administrative and physical arrangements of a school but rather than these things should not be a straight-jacket into which environmental education is placed.

The words 'learning situation' are used in the context of this framework to embrace several elements relating to the how, where and when aspects of an environmental education program. There is no single teaching/learning model that all learners will respond favourably toward under all circumstances. Some learners respond favourably when the teacher acts as a conveyor of information. Others respond better when the atmosphere is one of strong interaction between the teacher and learners in the pursuit of common goals. What is important is that teachers assess their personal skills and the particular situation and then blend teaching models in an effort to create the most satisfactory learning experiences.

The traditional teaching model is characterised by the teacher who is an expert in a predetermined body of knowledge and conveys this material to learners. The subject matter of the learning experience in this situation is governed by the teacher's specialised knowledge and other external controls such as publishers, committees, curriculum experts or public examination syllabuses. The teacher assumes the role of expert and the learners are presumed to have few attitudes or thoughts about the content until after the experience is completed. The virtue of teaching based on this model is that it is neat, tight, controlled and orderly. It is not however a completely satisfactory model for teaching in an environmental education program.

As environmental education involves awareness, attitudes and participation as three of its five objectives, it is inevitable that a major part of the 'how' of environmental education must involve learning experiences which encourage discovery and which are action oriented. This compels us to consider a teaching model in which the teacher is part of a teaching/learning team with the tasks of creating a learning situation, assisting the learners to acquire information, providing them with guidance, and participating with them in the learning process. The creation of the learning situation may necessitate assisting students to select the issues or case studies they wish to investigate.

The answer to the 'where' of an environmental education program cannot be right or wrong. The most effective environmental education programs will include a direct interrelationship of learners with the environment. This first-hand experience might be in a natural forest, in the sewers under the street, on the tidal mud flats and in the mangrove swamp, at a busy intersection, at the local garbage tip or on the school grounds. But a balance should be maintained between the traditional sources of experience and information and those which involve direct experience of the environment for a balanced program cannot be conducted solely at a field studies centre any more than it can in the classroom. It is worth noting that direct experience does not require a bus trip to central Australia for the classroom, the school grounds, the learner's home and the local environment are rich with possibilities. It is also important to note that the objectives of environmental education involve the development of sensitivity and awareness—characteristics which require the use of the learner's senses and first hand experience. They also involve participation—the taking of responsible action on the part of learners with the aim of ensuring more harmonious relationships between man and environment. These objectives can only be met when the learner is exposed to the reality of the environment.

IS ENVIRONMENTAL EDUCATION DIFFERENT AND WHO SHOULD TEACH IT?

The perennial argument about whether or not environmental education is different from other educational practice seems to bedevil its consideration in the context of the school curriculum. As we view environmental education as a process of knowing and thinking about the world around us, we claim that it is different, for this process is not the sole preserve of any one subject or discipline. It is not a new discipline, nor is it a new subject. However, the practice of adding 'environmental' to subjects such as biology, geography and even the whole of science is common-place particularly at the tertiary level. In reality, the word 'environmental' when added to a subject in this way usually means a novel way of teaching the same old material and not that the subject is an essential

part of an environmental education program or even contributing to such a program. We are not arguing that environmental science, geography or biology cannot contribute to an environmental education program but that they at best are simply that, a contributing part of a program.

Mayfield (1975) examined this question in more detail, advancing the idea that environmental education stood or fell on its affective and behavioural aspects. He said, 'Environmental education remains untaught, in every sense, unless at least three things are achieved beyond doubt: attitudes; genuine personal action; the transfer of knowledge and skills to new situations'. He went on to point out that in the teaching of, for example, physics something will be achieved by way of education about physics if it can be observed that learners have clarified concepts and learned skills. But if the purpose was environmental education then nothing of consequence will have been achieved if educators stop there. Lest the reader is saying, 'but physics is not part of environmental education because it is usually conducted in the classroom', let us add that environmental education is not the same as outdoor education or nature study at a field study centre, although these, like physics and other elements of the school curriculum, can be part of environmental education.

Most of the environmental issues of today are about cities, energy, population growth, food production and the conservation and management of natural resources. Environmental education is about knowledge, skills, attitudes and commitment to action which will enable men and women individually and collectively to confront and resolve these kinds of issues. It may involve a change in attitudes, a re-examination of values, not necessarily by teaching a new and prescriptive set of values, but perhaps by examining and clarifying our existing values in the light of a more informed awareness and understanding of the many facets of the environment. It is this process which makes environmental education different and it is at this process that teachers engaged in environmental education must succeed.

There is very strong agreement among specialists in environmental education that new courses added to the present primary and secondary school curriculum are *not* what is needed. Rather it is believed, and substantiated in part by the materials produced in the Curriculum Development Centre's Environmental Education Project that most existing courses or subjects can be used to develop concepts about or attitudes towards environmental concerns *if the teacher becomes aware of the possibilities* and *if the teacher and the school take seriously their respective responsibilities in this area.*

Some situations are obviously more promising than others. The primary school where a teacher typically has responsibility for a group of learners for much of a school day is clearly able to develop an environmental education program with that group more easily than the secondary school teacher who may provide learning experiences for six or seven different groups of learners each school day.

It is also evident that the environmental issues of greatest concern today are clearly interdisciplinary in nature. Where should the social impact of air pollution such as that associated with the industrial developments at Wollongong in New South Wales or the central business district of Melbourne in Victoria be studied? In social science classes since the problem is clearly of social concern? In chemistry and physics classes since these disciplines are also involved? In health education programs? In economics classes? In literature and music classes since young learners welcome the opportunity to express their feelings on such issues? Similar questions can be asked about all aspects of the environment and inevitably the answers will be the same.

Under the prevailing secondary school curriculum it is unlikely that environmental issues will receive the interdisciplinary treatment they require. Science teachers are not able generally to look at an issue and see all the ramifications apparent to a sociologist. The sociologist on the other hand may be unaware of scientific principles which are elementary and fundamental to the understanding of the environment. The historian will have a different perspective yet again. Some teachers will not even perceive that they have a role to play in environmental education.

For environmental education to really succeed *it is necessary for all teachers to regard themselves as teachers concerned with environmental education.* All teachers, possibly with the help of specialists in the methodology of environmental education, should locate and use materials which are pertinent to their own particular subject field and which are useful in sensitising learners and helping them to understand more about environmental matters. While primary school teachers are in a much stronger position to gear more of their teaching to environmental concerns, secondary school teachers also have advantages. Co-operation between subject areas may be administratively and practically difficult but team planning and

teaching has much to offer in developing environmental education at this level.

SHOULD ENVIRONMENTAL EDUCATION BE TAUGHT DIFFERENTLY?

We have already alluded to the fact that environmental education cannot be taught like most other subjects. There are three issues which must be squarely faced in answering this question.

Firstly, environmental education, in common with many subjects, is concerned with attitudes. As such it should involve learners in examining and thinking about the value conflicts inherent in Australian society which bear on our ability to manage the environment and our quality of life. At a personal level, learners should be encouraged to think about their own behaviour as it influences the quality of their living and that of others around them. Environmental education must allow learners to consider the options available in resolving the conflicts of interest inherent in environmental improvement and protection. They must become aware of what must be given up in order to gain something else.

Secondly, environmental education is concerned with co-operation. Improvement and management of the environment at all levels involves co-operation, and environmental education programs must help learners develop co-operative skills and attitudes. Co-operative efforts in the field of environmental education can develop at many different levels within the school setting. A single class group may undertake a beautification or clean-up project for the whole class or for the school generally. On the next level, the whole school may be engaged in studying, lobbying for and rectifying an environmental problem in the community in which they are situated. On a higher level again, a school or group of schools may work co-operatively with government and research agencies in an environmental study or management program.

Thirdly, while understanding about the environmental is a pre-requisite to action, the emphasis in an environmental education program must be placed on changed behaviour. Efforts of teachers should be directed toward helping learners develop behaviour patterns which contribute toward improving rather than demeaning their environment. Schools should help learners develop the habit of involvement and become used to assuming personal responsibility for environmental protection and management. Submitting petitions to the proper authorities, attending public hearings, and writing letters about environmental issues at all levels are examples of responsible long term behaviour which can commence under the guidance of a teacher and be continued throughout a lifetime.

It goes without saying then that environmental education must be taught differently if these things are to be achieved. Stenhouse (1975) has said that there appears to be three ways of teaching environmental education, though there are major variations on all of these:

> One is to treat environmental education as a topic in a general or liberal studies course. A second is to locate the heart of environmental education in the teaching of the sciences. The third is to regard environmental education as an emphasis which might express itself throughout the curriculum.

We believe that none of the approaches suggested by Stenhouse are entirely satisfactory. The first has the disadvantage that it tends only to reach the learners outside the professional and academically oriented stream. It also runs the risk that environmental education gets packaged into a separate compartment for a particular time and then forgotten like so many other school topics. The second approach although frequently presented as an integration of the sciences suffers in that it may only expose those learners in a science oriented stream to some environmental issues. In this situation it must not only compete with the traditional science disciplines which are accredited as a basis for further academic studies but suffers the problem of the environment being examined through a narrow disciplinary perspective. The third approach suffers from the inevitable conclusion that there is no essential skill and knowledge base to environmental education and that it is an effect that can be achieved through any subject area. This approach may vastly improve the subjects themselves by making them more relevant to the real issues of life but it is not environmental education.

What is required is a fourth approach, an approach which influences the subjects across the curriculum, both vertically and horizontally. It is an approach which integrates knowledge, teachers and learners so that the dynamic process that is environmental education can take place at the level of individual learners, groups of learners, and the whole school.

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ENVIRONMENTAL EDUCATION: K-7 CURRICULUM DESIGN IN A SMALL SCHOOL

David Prideaux
Alan Weymouth

PREAMBLE

Development of the whole school curriculum is no easy task, especially when there are only three teachers in the school and when they have to provide the enthusiasm, the expertise, and the vision to see it through. But it is possible, and particularly if assistance is available at key points along the way. This case study illustrates part of the process of whole curriculum development and focuses on the replacement of existing programs in Science, Social Studies and Health Education by an inter-disciplinary program based on the ethic of improving environmental quality. The new program placed emphasis on inquiry strategies and values clarification, both new approaches for the school. The gathering of suitable resources and the writing of new materials, particularly appropriate teaching/learning units, was greatly assisted by students from a nearby college of advanced education. The authors readily admit that development of the new program is at an early stage but point out that evaluation to date reveals that children are much more interested and motivated than previously and that they have responded positively to inquiry learning.

INTRODUCTION

This is a report of work begun in July 1978 at Paracombe Primary School, a three-teacher school in the Adelaide Hills. The work was a co-operative exercise between the staff of the school and the staff and students of nearby Murray Park College of Advanced Education, now Hartley College of Advanced Education, and involved a careful assessment and restructuring of the curriculum offerings in several areas to emphasise environmental education.

The Paracombe district is part of Adelaide's rural interface. It has been a fruit-growing area since the beginning of this century and has been protected from urban encroachment by planning regulations which have restricted subdivision. There has, however, been a recent influx of professional and semi-professional people onto farmlets, and this has brought about a change in the nature of the school population and in parental expectations of their children's schooling. At the beginning of the project, the school had fifty-seven children working in two wooden buildings and an aluminium 'transportable'.

What has happened since July 1978 has been a process of curriculum modification, not the development of a completely new program, and has required the rearrangement and consolidation of existing offerings as well as the addition of some important new emphases. The process began with an examination of the school's aims and the determination of a rationale for the introduction of environmental education that was consonant with those aims. From there it was decided to review the school's programs in Science, Social Studies and Health

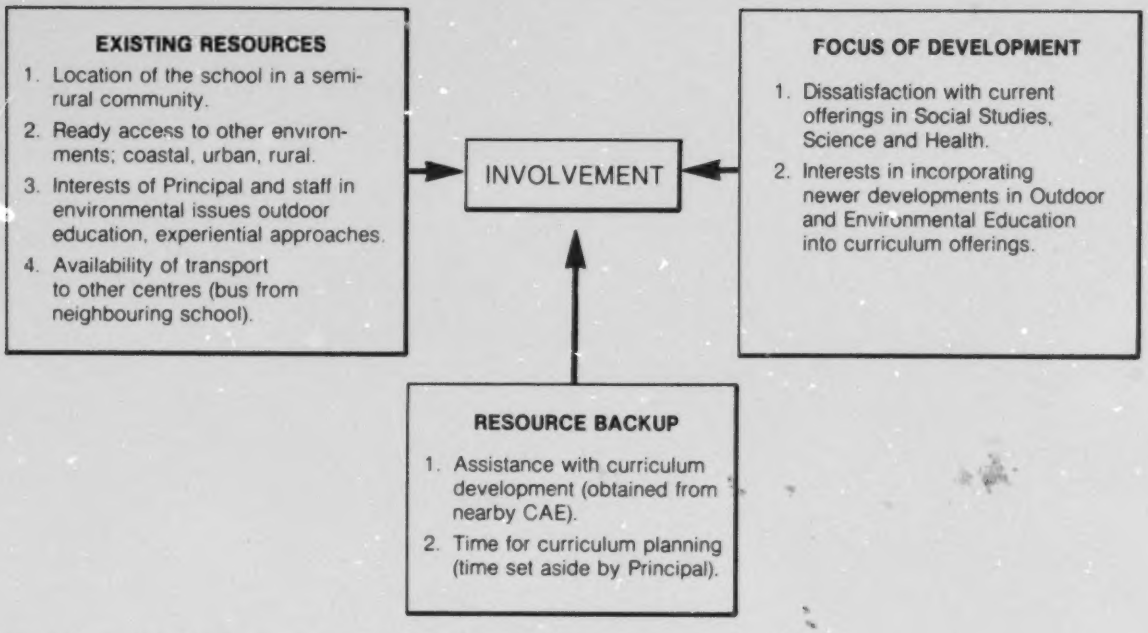
EXISTING RESOURCES
1. Location of the school in a semi-rural community.
2. Ready access to other environments; coastal, urban, rural.
3. Interests of Principal and staff in environmental issues outdoor education, experiential approaches.
4. Availability of transport to other centres (bus from neighbouring school).
INVOLVEMENT
FOCUS OF DEVELOPMENT
1. Dissatisfaction with current offerings in Social Studies, Science and Health.
2. Interests in incorporating newer developments in Outdoor and Environmental Education into curriculum offerings.
RESOURCE BACKUP
1. Assistance with curriculum development (obtained from nearby CAE).
2. Time for curriculum planning (time set aside by Principal).

FIG. 2: ***The Decision to Become Involved: Important Factors***

Education in the light of new developments in these fields, and, most importantly, to consider the integration of these subjects in a curriculum which would incorporate an environmental and outdoor emphasis. Through this it was also hoped that the school grounds would become a key resource.

Three sets of factors (see Figure 2) influenced the decision to develop an environmental education program at Paracombe. Most important was the school's semi-rural location and the interests of the staff, but staff dissatisfaction with the school's offerings in Science, Social Studies and Health Education and their awareness of major developments in these areas at a State level were also significant. The ability of the Principal to set aside three hours on one morning each week to work on the curriculum and the provision of support from Murray Park College of Advanced Education provided the means by which the program was developed.

Guiding principles of environmental education (Figure 3) were established when the decision to embark on an environmental education program was made. These principles were arrived at by assessing the particular contribution that Environmental Education could make to the achievement of the aims of the school (see Figure 4). For this purpose, environmental education at Paracombe has been viewed as a process directed towards the improvement of environmental quality. This would take place in an interdisciplinary framework (i.e. Science, Social Studies, Health Education) with oppor-

FIG. 3: ***Guiding Principles of Environmental Education***

GUIDING PRINCIPLES OF ENVIRONMENTAL EDUCATION

Environmental education will involve the following principles:

1. emphasising process rather than product;
2. developing a commitment to maintaining and improving environmental quality i.e. education *for* the environment;
3. encouraging integration of school subjects (Science, Social Studies, Health);
4. stressing enquiry and discovery methods;
5. providing opportunities for group work and group processes;
6. providing opportunities for values education and values clarification;
7. providing learning experiences in outdoor situations;
8. utilising a range of learning environments (classroom, school yard, local area, other areas);
9. encouraging student planning and involvement.

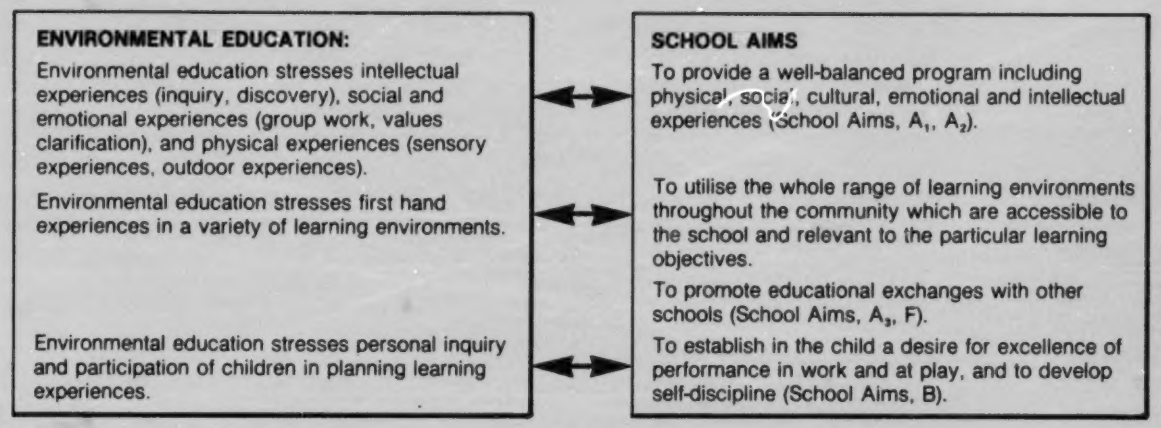
ENVIRONMENTAL EDUCATION:
Environmental education stresses intellectual experiences (inquiry, discovery), social and emotional experiences (group work, values clarification), and physical experiences (sensory experiences, outdoor experiences).
Environmental education stresses first hand experiences in a variety of learning environments.
Environmental education stresses personal inquiry and participation of children in planning learning experiences.
SCHOOL AIMS
To provide a well-balanced program including physical, social, cultural, emotional and intellectual experiences (School Aims, A1, A2).
To utilise the whole range of learning environments throughout the community which are accessible to the school and relevant to the particular learning objectives.
To promote educational exchanges with other schools (School Aims, A3, F).
To establish in the child a desire for excellence of performance in work and at play, and to develop self-discipline (School Aims, B).

FIG. 4: ***The Aims of Paracombe School and Environmental Education***

tunities for student involvement in planning, development of problem solving skills, values clarification and first-hand experience in a variety of settings.

The guiding principles provided the framework for the identification of the following aims for Environmental Education at Paracombe. These aims are expressed in a way consistent with the inquiry/process emphasis of the guiding principles.

AIMS

To provide experiences so that the children will:

- *develop concepts and generalisations which will assist in their understanding of the following:*
  - *(a) class, school and local environment;*
  - *(b) environments of different communities and societies;*
  - *(c) processes of life, growth and change in the environment and the interdependence of organisms in the environment;*
  - *(d) the inter-relationships of people and the environment.*
- *use inquiry methods and develop skills in inquiry learning in order to:*
  - *(a) identify problems, pose questions, formulate hypotheses;*
  - *(b) find or generate data;*
  - *(c) analyse data and make and apply generalisations;*
  - *(d) communicate the results of their enquiries to others.*
- *develop group interaction skills through group discussion and group decision-making;*
- *develop a commitment to maintaining and improving environmental quality;*
- *examine and clarify the attitudes and values of others to the environment;*
- *value the process of inquiry in personal decision-making about the environment;*
- *develop a commitment to taking increasing responsibility for the management of their own learning programs.*

CONTENT SELECTION AND ORGANISATION

Course offerings at Paracombe have been under review for some time in response to new curriculum developments in South Australia, but once the aims of the environmental education program had been determined it was possible for the whole staff to make a careful assessment of work in Science, Social Studies and Health Education. The Social Studies taught at the school was based upon a 1967 course. Science and Health Education were not taught in a systematic way—their treatment depending upon the particular strengths and interests of individual teachers. There had been some emphasis on animal studies in science programs at the school. Children had successfully hatched duck eggs and had cared for native plains rats. A native garden had been established at the school and some work had been done in the area, although the garden itself needed some attention. A vegetable garden had also been started. It was thought that the gardens should become part of the new program. It was also proposed to expand the work in animal care in an 'Animal Studies' topic. Year 7 children had been engaged in simple weather observations and this led to an interest in including a topic on 'Life and the Seasons'.

In reviewing the Health and Social Studies courses it was decided to update the school's offerings in line with new State-wide programs being piloted at the time. Not all topics from these new programs were included. Those that bore the greatest relevance to the 'aims' and 'guiding principles' were selected. Thus the 'Environmental Health', 'Work and Leisure', and 'Safety Education' units were selected from the Health Education course while those that dealt with 'Growth and Development' or 'Personal Health' were omitted. Similarly, topics from the themes 'Our Natural Environment' and 'Inter-cultural Studies' were chosen from the Social Studies course, while less attention was paid to some aspects of 'Satisfying Our Needs and Wants' or 'Organising Ourselves'. However the other topics were not completely ignored, as it was thought that there may be some important omissions if the environmental education program was to comprise the total offerings of the school in Science, Social Studies and Health Education. A Social Studies course which did not give some attention to the multi cultural nature of Australian society would have some deficiencies as would a Health Education course

FIG. 5: *Environmental Education Topics*

		K-2	3-4	5-7
AREA STUDIES	1	Classroom Environment	Classroom Environment	Classroom Environment
	2	School Environment	School Environment	School Environment
	3	The Local Community and its Environment	The Local Community and its Environment	The Local Community and its Environment
	4		Local History-Museum Project	Local History-Museum Project
	5	Different Communities and their Environments	Different Communities and their Environments	Different Communities and their Environments
	6		South Australian Environment	
	7			Australian Environment
	8	Different Societies and their Environments	Different Societies and their Environments	Different Societies and their Environments
LIFE AND GROWTH STUDIES	9	Basic Requirements for Life and Growth	Basic Requirements for Life and Growth	Basic Requirements for Life and Growth
	10	Life and the Seasons	Life and Seasons	Life and Seasons
	11	School Garden	School Garden	School Garden
	12	Growing Native Plants	Growing Native Plants	Growing Native Plants
	13	Animal Studies	Animal Studies	Animal Studies
	14	Interdependence in the Environment	Interdependence in the Environment	Interdependence in the Environment
	15	Patterns. Similarities/ Differences in the Environment	Patterns, Similarities/ Differences in the Environment	Patterns, Similarities/ Differences in the Environment
	16	Change in the Environment	Change in the Environment	Change in the Environment
PEOPLE AND THE ENVIRONMENT	17	Living with/Conserving the Environment	Living with/Conserving the Environment	Living with/Conserving the Environment
	18	Using Natural Resources	Using Natural Resources	Using Natural Resources
	19	Health and the Environment	Health and the Environment	Health and the Environment
	20	Leisure and the Environment	Leisure and the Environment	Leisure and the Environment
				Year 7: Man: A Course of Study; People of the Western Desert

(For a further expansion of three of these topics see Appendix I.)

ADAPTATION
Organisms inherit characteristics which improve their chances of survival in a particular environment.

CAUSALITY
Situations and events in natural and human environments are influenced by factors which have preceded them and their study is made more meaningful by examining the relation of cause and effect.

CHANGE
Change occurs in natural and human environments. The rate of change may differ for different aspects of natural and human environments and some aspects may undergo little change.

CONSERVATION
In order to prevent the extinction of some organisms and to satisfy human needs, both physical and social, some aspects of natural and human environments should be protected from large-scale changes.

CULTURE
The culture of a social group is its total way of life and is passed on from generation to generation.

GROUP
In any society, people form groups for the satisfaction of social and personal goals.

INTERACTION
Individuals or groups interact in different ways. Co-operation or conflict may be the result of interaction.

INTERDEPENDENCE
All organisms depend on other organisms for the satisfaction of physical and social needs.

LOCATION
The location of any place is its situation in relation to other places. The location of a place affects its natural and human environment.

NEEDS
All organisms have basic physical needs, which must be satisfied. In human societies there are social needs which also must be satisfied.

PATTERNS
In natural and human environments phenomena can be grouped together on the basis of related characteristics. Such groupings are commonly called patterns.

SIMILARITIES/DIFFERENCES
There are many similarities and differences in natural and human environments.

TECHNOLOGY
Technology comprises both tools and ability to make and use tools.

VALUES
People place a quality of desirability or undesirability on ideas, beliefs, objects and actions. This may affect their behaviour.

Based on Department of Education, South Australia (1978), and National Environmental Education Development (1974).

FIG. 6: *Key Concepts*

without mention of Personal Health or a Science course without reference to Physical Science. It was decided that on completion of topic development for the environmental education program supplementary Social Studies, Health and Science topics would be outlined at various grade levels. A preliminary listing of such topics indicated that there would not be a great many of these, and they could be taken at various intervals during the year in addition to the environmental education program. During the process of content selection and organisation the Principal attended a seminar dealing with the interdisciplinary Social Studies units *Man. A Course of Study* (MACOS) and 'People of the Western Desert'. It was decided to adopt these for Year 7 and teach them in combination with other work.

From these considerations a list of topics was compiled, and attempts were made to categorise these topics under various headings in order to give some structure to the program and indicate possible approaches to sequencing. After several attempts at such categorisation three broad themes 'Area Studies', 'Life and Growth Studies' and 'People and the Environment' were adopted and topics were listed under the appropriate theme and sequenced (see Figure 5). For a further expansion of three of the topics see Appendix I.

During the selection of topics, a number of key concepts or key ideas recurred. These were isolated and added to the list of topics to provide a summary of the main understandings to be developed in the program (see Figure 6).

The content of the environmental education program as outlined in Figure 5 cannot be regarded as static. As implementation takes place it will probably undergo some change as topics are deleted or added. Indeed shortly after the original list had been completed plans were drawn up to include topics which would involve

children in monitoring changes in the school environment as a result of a decision to build a new school in 1980. It is envisaged that staff will meet periodically to review and revise program content.

NEW EMPHASES: INQUIRY LEARNING AND VALUES CLARIFICATION

Enquiry learning and values clarification have been stressed throughout this program. As these were new areas of development in the school, it was thought that special attention should be paid to them and that they should become a major concern of the implementation phase. The approach to these areas was influenced by the draft edition of the new South Australian Social Studies course (Education Department of South Australia 1978). The models of inquiry learning and value clarification set out in the draft course were examined and adapted for this program. It was decided to work within the spirit of this course as there was a document for reference for teachers and a possibility of advisory teacher assistance.

Two particular areas of concern in inquiry learning were identified—initiating the inquiry, and skills of inquiry. To overcome difficulties in the first area it was decided to encourage teachers to construct a number of 'focusing questions' to introduce each topic. These would be developed in the program planning stage and would be recorded on programming sheets. It was envisaged that as the course proceeded a bank of focusing questions would be built up. A number of skills and processes considered to be fundamental to inquiry learning were identified and listed. Although it was recognised that skills do need some continuous development, it was agreed that teachers would deal with them as the need arose. Teachers were encouraged to record skills on the programming sheets and to ascertain the level of skill development of their children before teaching skills.

In dealing with values questions the 'values clarification' approach of Raths, Harmin and Simon (1966) was adopted. Such a process encourages children to consider alternatives and make their own decisions on values issues. From this, a values clarification strategy based on the draft South Australian Social Studies course was designed for the school.

Involvement in values education at this stage has been limited to the values clarification approach because this is a useful starting point for teachers and was the approach set out in the Social Studies course. As teachers gain confidence it is hoped that other values education strategies might be tried.

The Paracombe program does emphasise a commitment to maintaining and improving environmental quality, and this was designed to be a recurrent theme in the course. It was assumed that this attitude would be 'caught' rather than 'taught' and that children would develop this commitment after years of participation in experiences which stimulated them to inquire into, and consider issues involved in their own environment.

TEACHING/LEARNING ACTIVITIES AND RESOURCES

Once the broad framework of inquiry and values clarification was established, attention was turned to the selection of appropriate teaching/learning activities and the identification and collection of resources. It was at this stage that Murray Park students made a major contribution. Some students developed topics as part of a curriculum studies unit in Social and Environmental Education. This involved developing ideas for content, suggesting teaching/learning activities and identifying relevant resources. The completed topic plans have been kept on file at the school, and will be available for teachers as they plan topics for their classes. It is hoped that the teachers will add to this topic bank. Using the students' topic plans as a starting point a list of possible teaching/learning strategies which were appropriate to an inquiry approach was compiled, and teachers are able to select strategies from the list. It was also suggested that a modified version may be made available to children through a wall poster which they may use as a guide for planning their own inquiries.

A similar process was established for identifying resources, and a master list of types of resources for use by teachers and children was compiled. One of the direct outcomes of the program was that the school was able to obtain borrowing rights to MACOS films from the College library.

FROM DESIGN TO IMPLEMENTATION

The involvement of parents has been an important component of implementation. In late 1978 a series of meetings took place with parents to discuss the aims, guiding principles and draft content. Parents were consulted in 1979 as details of the implementation phase were worked out. A measure of parent support

was received for the project through assistance with the development of the garden area, provision of a garden shed and tools and support for the purchase of library books and other materials.

One of the major steps in the implementation phase has been the purchase of resources. As well as a half share in MACOS, the school spent more than $300 on library materials and equipment such as compasses. This represents a significant expenditure in a small school budget and greatly improved the resources of the school in environment related areas.

The curriculum document in environmental education was completed towards the end of Term I 1979 and school-wide implementation began in earnest in Term II, although Year 7 children began MACOS at the beginning of the year and Year3-6 children started work on some of the topics from their levels.

In Term II teachers of the three levels (K-2, 3-4, 5-7) selected topics for implementation. Discussion on inquiry learning continued at the school, and it was proposed to close the school for a whole day in Term III for a conference on inquiry learning and values clarification which would include teachers, parents, advisory personnel and CAE lecturers. In the meantime teachers prepared units which would introduce children to the inquiry approach. As this represented a change in teaching and learning for both teachers and children, the change was to be gradual, culminating in an intensive workshop during the conference in Term III.

Towards the end of Term II some of the children began to develop some facility with the inquiry approach, albeit still a 'guided inquiry'. The Year 5 and 6 children, for example, were able to locate and use a great deal of information on the local area in the Local History/Local Community topics, and began to show some ability to seek information for themselves. A camp was held for Year 5-7 children in Term III and some transfer of inquiry processes and skills occurred when the children investigated the local history of west coast towns in South Australia. The children's ability to work in groups also improved. The Year 3-4 children, too, located material on the local area and parents made a contribution to the program through the teaching of folk crafts and butter and cheese making. A camp was planned for the latter group to take place in Term III.

Other aspects of the overall program also began in late 1978 and early 1979. To date, two major projects have been initiated—the establishment of garden and animal areas, and a local history museum project.

A native garden was established at the school in 1966 but it had become overgrown by the beginning of this program. As part of their involvement children have restored parts of the area and have propagated and planted new species. The vegetable garden was started in May 1978. Each class was allocated a plot for vegetables and Friday afternoon was set aside for gardening. This has increased social interaction within the school and helped to develop a school identity. The gardening project widened as students began to suggest other projects in the school yard including the construction of a garden shed, a propagation area and an outdoor stage. A duck pond for five ducklings hatched in 1978 was built under parental supervision. A bird bath, nesting box and pigeon and bantam keeping areas have also been planned.

The local history museum project has been an exciting development. With the assistance of a local parent who is a technical college lecturer, Year 7 children restored a dilapidated twin furrow plough to full working order. The possibility of organising a working demonstration with a team of Clydesdale horses was suggested. Other restoration projects undertaken included a stationary pump engine, grinding wheel and K-type school desks. The project has been extended to include collection and identification of small items such as bottles and kitchen utensils. Parental interest was generated by the projects and documents, photographs and movie films of Paracombe were located for future use. Larger items such as the plough will be mounted in static displays in the school grounds. In the future it is hoped that a permanent covered area may become available for a museum restoration area which could become a focal point for the community, and it is proposed to establish an elective program in folk crafts.

With the beginning of implementation have come suggestions for change in parts of the program. Some practical difficulties emerged in attempts to work with MACOS with the Year 7 children and run the 5-6 program at the same time, as the Year 5-7 children were grouped together in one class. To overcome this, plans were made to teach MACOS to Year 5-7 together followed by a two-year period on the planned 5-6 program. Unfortunately, work in the garden had to cease temporarily as the garden areas became part of a site for the new school planned for 1980. Other developments in the school yard also had to be postponed until the completion of the new school.

EVALUATION

It is too early to evaluate the effectiveness of the program which will be reviewed when implementation is complete. The review will use the guiding principles as its reference point and will involve parents, teachers and advisory personnel.

Evaluation of the children's development, on the other hand, has been an integral part of this program from the outset. Plans for an evaluation scheme were drawn up early in 1979. This is to be implemented gradually as the inquiry learning episodes are introduced. In choosing evaluation methods relevant to the acquisition of concepts and generalisations a combination of pen and papers tests, oral questioning, interview and construction of charts, posters and diagrams is used. Group reporting sessions are also used to evaluate conceptualising and generalising. It is thought that inquiry processes and skills are best evaluated by observation and discussion, with the teachers compiling checklists of skills which the children gain. An example of such a checklist is set out in Figure 7. Similar methods are to be used in evaluating and recording group interaction.

FIG. 7: *Evaluation: Skills and Processes*
Sample checklist for one skill: Surveying

NAME AND YEAR LEVEL

SKILL	DATE/S OF EXPERIENCE	COMMENTS
Surveying: (1) Establishing purpose (2) Preparing questionnaire (a) constructing suitable questions (b) trialling questionnaire (c) checking questions for relevance and clarity (3) Selecting group to be surveyed (size, availability) (4) Collecting and recording information (5) Preparing information for 'data processing'		

In evaluating the process of values clarification, observation and discussion were again considered to be appropriate. Teachers look for examples of children seeking various types of information, using that information in deciding on value issues and suspending judgment on issues or problems until they have a chance to seek such information. This can be documented in the form of anecdotal records (see Figure 8). The evaluation of the children's commitment to maintaining and improving environmental quality is also to be informed and anecdotal, particularly as this is a long term aim which it is hoped will be developed over the total program.

FIG. 8: *Evaluation—Values and Attitudes*
Sample record

NAME AND YEAR LEVEL

VALUING PROCESS	COMMENTS/ DATE
(1) Becoming involved in discussing values issues and problems. (2) Seeking information on alternative points of view and considering these different viewpoints. (3) Suspending judgment on issues or problems until a number of alternative views have been considered. (4) Choosing a point of view. (5) Acting in accordance with choice. (6) Being sensitive to the values and attitudes of others. (7) Any other important considerations.	

CONCLUSION

Substantial judgments on projects of this type must await their full implementation, and in that sense full conclusions cannot be drawn here. But at least two features have emerged. The whole exercise has generated and maintained an interest in and commitment to environmental education for the teachers and this interest is vital to such a project. Parents, too, have taken interest in the project. The second development of note has been children's positive responses towards inquiry learning experiences, and the greater interest and involvement they have shown in their studies than in the former programs offered in Social Studies, Science, and Health. These are encouraging signs pointing to the likely success of the program.

ACKNOWLEDGMENTS

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APPENDIX I—TOPIC EXPANSION

All topics from Figure 5 were expanded by school staff and students from Murray Park. Examples of three such 'expansions' are included here.

I. AREA STUDIES

TOPIC 3: **THE LOCAL COMMUNITY AND ITS ENVIRONMENT** — **KEY CONCEPTS:** Group, Interaction, Needs, Interdependence

K-2	3-4	5-6
(1) **Orientation Plan Making** —children's homes —walks, trails	—immediate environment As for K-2	—district environment —orienteering
(2) **Local Industry** —orchards, cold stores	—jam factory —reservoirs	—pine forests —sawmills
(3) **Local Services** —CFS, Police, Telecom, Doctor, Medical	—recreation groups	—local council, —community —organisations: Progress Association, Pre-school, Church, Red Cross, CWA
(4) **Local Environment** —flora and fauna, e.g. native, domestic	As for K-2 —major geographical features	As for K-2 —decision-making in the local environment, e.g. planning regulations, water catchment areas, Hills Face Zone, State Planning Authority, Local Council, Local MPs

II. LIFE AND GROWTH STUDIES

TOPIC 13: **ANIMAL STUDIES** — **KEY CONCEPTS:** Needs, Adaptation, Conservation

K-2	3-4	5-6
(1) **Care and observation of animals** e.g. ducks, plains rats, goldfish	e.g. guinea pigs, rabbits	e.g. goats, hopping mice
(2) **Development of animal areas**	As for K-2	As for K-2
(3) **Conservation** —need to protect	—care of sick, injured and orphaned native birds and animals	—endangered animals —laws and regulations

TOPIC 20: **LEISURE AND THE ENVIRONMENT** — **KEY CONCEPTS:** Needs, Technology, Values, Culture

K-2	3-4	5-6
(1) **Developing Leisure Activities** hobbies, electives	pursuing/developing interests in particular leisure activities	recreation and health importance of activity influence of advertising consumer health
(2) **Leisure and the Environment** importance of safe play areas for children	outdoor recreation areas, importance of outdoor activities	leisure activities and the environment, effects of particular activities on the environment

ENVIRONMENTAL SCIENCE, K-2

Dorothy Pearson

PREAMBLE

The use of the outdoors as a learning environment is fundamental if children are to appreciate and understand fully the world in which they live. But the task of structuring children's exposure to the complexities of the world outdoors is not an easy one. Dorothy Pearson has chosen to concentrate on plants in the model program she devised for Kindergarten to Year 2 children and to explore the theme selected for each year level through a series of *ministeps* or a logical sequence of facts. The ministeps provide the focal points for lessons or parts of lessons and she describes how they were used to develop children's knowledge and skills in sensory awareness, language, mathematics and science. Apart from encouraging a general love of the outdoors, she was careful to avoid imposing adult values on the children.

The program Dorothy Pearson describes was part of a ten-day in-school in-service course she conducted over ten weeks. She used the program to work with children out-of-doors while the teachers and parents observed her. Classroom follow-up was the responsibility of the class teacher. As the program evolved the staff modified the outline and planned the detail. As their confidence developed, the author's role changed from initiator to that of an assistant.

INTRODUCTION

Where is it that education takes place? It is only inside classrooms or can it also take place out-of-doors? My belief that it is not only possible, but that it is also effective, exciting, and efficient to teach out-of-doors, has led me to explore the use of the world beyond classrooms for science in Years K-12. I use the out-of-doors as a resource from which the students garner facts through their senses. Such first hand sensory experiences are a substitute for books, films, photographs and TV programs and as such are a fundamental focus for teaching and learning. For example, children's sensory and scientific awareness can be extended through finding communities of plants on the soccer field; their language then must develop as they seek to describe that which they see; and their mathematical concepts may be reinforced as they find shadows of the surrounding trees and fences that are smaller or larger than themselves.

I designed and led one such program out-of-doors involving the Infants Department at Guyra Central School, New South Wales in 1978. The program aimed at developing basic ecological concepts through the children's own sensory experiences out-of-doors. The resources for the course were *all* outside—the shapes of leaves, the movements of shadows, the sizes of plants, the diameters of stems, the appearance of buds, the rotting of fruits and flowers, and so on. So it was a factual course. These facts could begin to form a basis for the later development of attitudes towards the out-of-doors and towards the environment as a whole. My objectives were:

- to initiate in children an ability to really see, hear, feel, smell and taste that which is

under their feet, around them and beside them: that is to extend their sensory awareness of the world out-of-doors;

- to demonstrate that such experiences with reality can be used so that children themselves can derive knowledge from them;
- to facilitate teachers' fieldwork out-of-doors and associated scientific work indoors.

For Kindergarten children I chose to work in the area of plants and their parts for Year 1 to introduce the concept of the interaction of plants and light, and for Year 2 to focus upon changes in a dam community. Each of these areas was then divided into a series of logical sequential facts that could form the basis of separate lessons. These are my ministeps (see Figure 9).

FIG. 9: ***Teaching in the outdoors through ministeps***

MINISTEPS

Ministeps are a logical sequence of facts which provide focal points for lessons out-of-doors.

KINDERGARTEN	**YEAR 1**	**YEAR 2**
Main focus: Plants	Main focus: Plants	Main focus: Plants
Year focus: Plants and their parts	Year focus: Plants and light	Year focus: Changes in dam communities
(1) The ground may be bare or may be covered with plants.	(1) Warmth travels from the sun to the earth.	(1) Plants of the playing fields are different.
(2) The ground may be flat or may have a slope.	(2) Clouds are in between the sun and us and so make sunlight less bright and less warm.	(2) Different plants have different leaves.
(3) The surface of the land has holes in it.	(3) Objects may be opaque (e.g. tree trunk), translucent (e.g. clouds) or transparent (e.g. air.	(3) Leaves have edges which are different when from different plants.
(4) Soils have different colours.	(4) Opaque objects form shadows.	(4) Plants have different shapes.
(5) Plants have leaves.	(5) Opaque objects that lie flat upon the ground have shadows underneath them—these cannot be seen.	(5) Plants feel different.
(6) Plants have different shapes, edges, sizes and feel.	(6) Shadows are different in size.	(6) Plants flower at different times.
(7) Plants have fruits (a fruit is that part of a plant that contains the seeds).	(7) Shadows are different in shape.	(7) Different plants grow in different places.
(8) Fruits are different.	(8) Shadows have different densities.	(8) Sometimes there are many more of one type of plant in one place than in another place—this plant then forms the dominant plant.
(9) Fruits change over time (they grow, ripen and rot).	(9) Shadows have different edges.	(9) Plants grow near each other and so form plant communities.
(10) Plants have flowers.	(10) Shadows change during a day.	(10) Nearby environments are different (e.g. dam bank, dam edge, overflow and inflow areas, deep and shallow water zones).
(11) Flowers change over time and may grow into fruits.	(11) Shadows change during the year.	(11) Plant communities are different in different environments.
(12) Plants have roots.	(12) Northern sides of things have more sunshine than southern sides.	(12) Animals move around, plants do not.
(13) Roots usually grow in the soil.	(13) Plants shade areas beside and underneath them—they therefore alter the environment near them.	(13) Animals have different shapes.
(14) Roots are different.	(14) There may not be plants growing underneath other plants.	(14) Animals do different things.
(15) Similar plants have similar roots.	(15) Plants occupy specific spaces.	(15) Different animals live in different environments (e.g. above the water, on the water, in shallow water, in deeper water, in mud, still water and flowing water).
(16) Plants have stems.	(16) Plants differ in shape.	(16) People change environments by e.g. digging, ploughing, planting seeds, stacking wood, or making compost heaps.
(17) Stems are different in size, colour, shape and feel.	(17) Plants differ in size—consider trees and cabbages.	(17) Some plants live entirely under a water surface.
(18) Stems of plants have buds on them.	(18) Energy travels from the sun to the earth.	(18) Some plants live with their roots always in water.
(19) Trees branch in different ways.	(19) Plants may hold their leaves horizontally—they then absorb lots of the sun's energy.	
(20) Buds are not always there!		
(21) Buds grow into leaves, stems and flowers.		

(20) Plants may hold their leaves vertically—they then absorb very little of the sun's energy.

(21) Plants may hold their leaves obliquely.

(22) Some trees lose their leaves in winter.

(23) Some trees have leaves in winter and summer.

(24) Some plants such as lichens, mosses and algae, grow on other things.

(25) Different groups of plants grow on the northern and southern aspect of things.

(26) Some plants are never green; some plants may sometimes be green.

(27) Some plants are white or yellow if grown in the dark, e.g. in a cupboard or under a board outside. These plants become green if light falls upon them.

(19) Some plants live with their roots in mud, their stems in water and their leaves floating on top of water.

(20) Some plants float.

(21) Flowing water changes the shapes of plants.

(22) Communities change with the seasons—annual plants grow, flower, fruit, disperse seeds and die; animals hatch, grow, reproduce and die. Perennial plants grow, flower, fruit, disperse seeds and grow again; other animals grow, reproduce, and continue to live and grow from year to year.

The ministeps were planned to be the focal points of lessons, perhaps a number to a lesson, or vice versa; but the children, as expected, changed all that. Once we had begun, their responses and visions necessitated constant modifications to our planning, but these ministeps did remain as the foundation stones of the knowledge that I wished them to acquire.

To begin with then, I decided to assume that the children would know nothing of plants, leaves, roots, daily changes in shadows, opaqueness, north and south, deciduous trees, living communities, dominance, plants whose leaves float upon water, the directional feel of leaves, or flowering seasons, that is naught of the real world of nature outside their doors. How true that was! Not only did they know little, they had not yet even really seen that living world out there; they saw but a smear of things.

For example, on our first visit outside, the Year 2 class saw only manufactured things, such as cars, roads, fences, buildings and the school bell. They had to be directed to the green things that they were standing upon. On a later visit, that same class saw and talked incessantly about 'our flat plant', 'our clumpy plant community' and 'our creeping plant'. So they now perceived. With the Year 1 class our work was to begin with shadows, but some children did not even know what a shadow was. Once having learned to see shadows, they had to learn words such as dappled and dense, to describe them. Then we found that they had no concept at all of 'edge', so we digressed and handled edges of buildings, books, leaves, roads and finally shadows. Again, we taught specific words to describe these shadow edges, such as notched, straight, curved and crinkled. Such mathematical concepts as 'longer than', 'wider than', and 'as long as' were easily reinforced out-of-doors. But their experiences went beyond descriptive observation to include observation that really surprised and puzzled them. The children were surprised to discover, for example, that at 11 a.m. their shadow no longer fitted their 9 a.m. shadow. Here then was our opportunity to question and their chance to put their thinking caps on—an essential step!

While the ministeps provided a structural sequence, I found with Year 2 that all of the twenty-one ministeps had to be treated *before* they could begin to see the dam as it was and before they could master ministep twenty-two. They were then and *only then,* ready to begin on their observations and recordings of changes in the dam communities. But then, these were their first experiences out-of-doors—further visits would require less preparation for the children.

LESSON PLANS

The details of some of the lessons based upon the above concepts are given below. Included are the lesson activities, the associated language, the underlying scientific and mathematical concepts, the sensory awareness upon which the lesson was based and the extension and reinforcing activities undertaken during the ensuing week by the class teacher.

The details of specific lessons were only planned from week to week—they evolved from the experiences of the children and following discussions held before and after each lesson with parents and teachers.

1. KINDERGARTEN

FOCUS: PLANTS AND THEIR PARTS

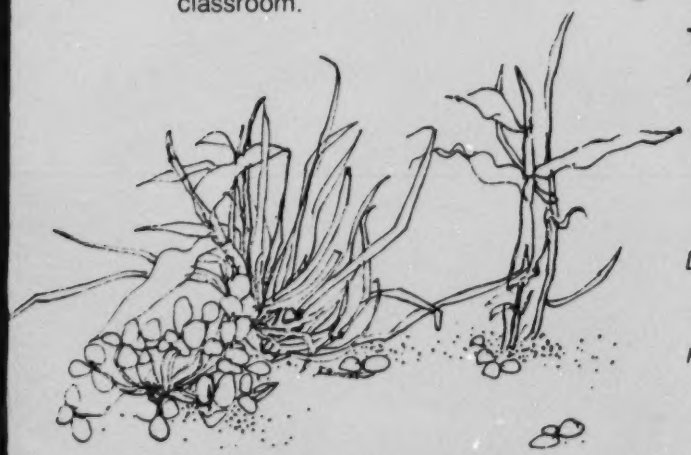
The First Experience

Activities—

Hold hands in a circle and sit on ground.
What colour thing did you sit upon?
Find a green thing. Touch it.
Stand on bare soil. Feel it. Notice the colour of your hand.
Sit on it and dust your bottom.
Walk down a slope and up a slope. Stand on a flat area.

Teacher's post-field activities—

Develop concepts of more than, less than with the children's stone collection.
Extend concepts of slope—roll up and down slopes, roll balls up and down slopes.
Repeat previous out-of-doors experiments. Develop concept of 'bare' within the classroom.



Plants may have bare ground around them.

The future—

To light and dark green colours, add 'green and white'.
Go to a different area and try to find bare areas, green plants, white plants, etc.
Then extend perceptions of these: e.g. cracks in the hand and compacted soil.

Language—

Rock, bare, soil, slope, stone, flat, yellow, brown, white, green, not green.

Children and slopes.

Mathematical concepts—

More than, less than.

Natural Science concepts—

The ground may be flat or may have a slope.
The ground may or may not be covered with plants.

Sensory awareness—

The feel and colour of soil.
The feel and colour of rocks.
The colour of plants.

Comments—

All ignored plants that were both green and white.
It was difficult for the children to find 'not green' plants, despite their abundance.

The Second Experience

Activities—

Whole class: Find a hole and describe it.
Groups: Walk to the fence finding holes and what is in them.
Walk along the fence looking for bare soil and noting its colour.

Language—

Hole, wide, shallow, narrow.

Plants growing around a hole.

Natural Science concepts—

The surface of the land has holes in it.
Soils have different colours.

Sensory awareness—

The feel of walking across uneven ground.
Extension of their perception of colour.

Comments—

Generally regarded 'holes' as a sidetrack. My intention to extend their perception of bare areas was not clear and not attained.

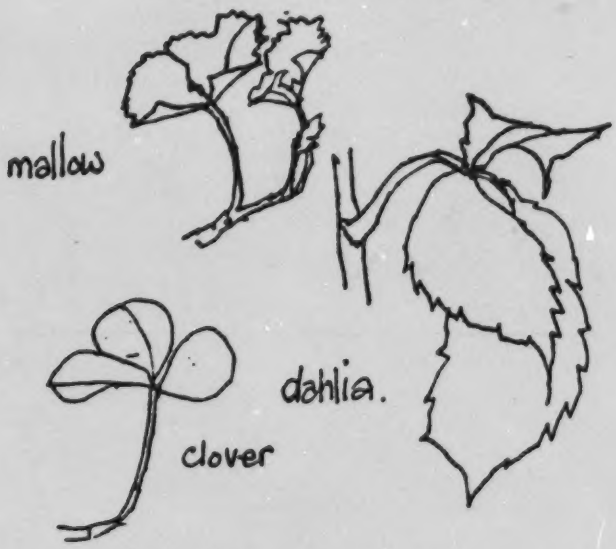
The Third Experience

Activities—

Indoors: Discuss known geometrical shapes — square, rectangle, triangle, circle. Handle attribute blocks.

Out-of-doors: Go out in groups with parent or teacher leaders and find four leaves of different shapes.

Indoors: Place leaves upon attribute blocks of similar shape (if possible). Discuss.



Leaves are of different shapes and sizes.

The future—

Consider shapes and colours of flowers and fruits.

Language—

Straight, rounded, square, rectangle, triangle, circle.

Mathematical concepts—

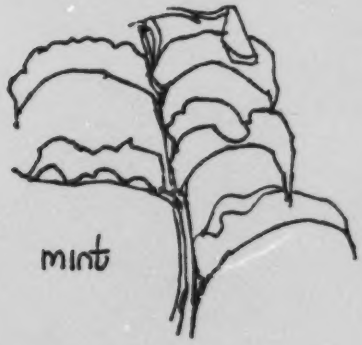
Shapes of things.

Natural Science concepts—

Plants have leaves. Leaves are of different shapes.

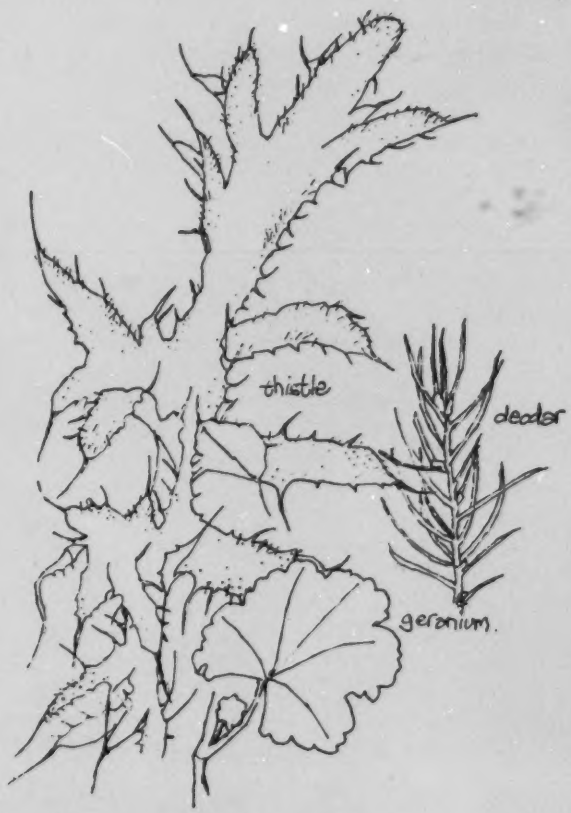
Sensory awareness—

Observation of leaf shapes.



Comments—

Shapes are very important in first term kindergarten work—hence this work on shapes is easily integrated. The shapes are approximations only—no squares were found, so one group tore a leaf to make it square. The concept of 'nearly square' will be reinforced.



Some leaves have spines on them (thistle), others are needle-like (deodar), and still others are smooth (geranium).

THE SETTING

The School.

The southern playing fields.

The dam.

Where one class began its activities out-of-doors.

Our flat plant.

PLANTS

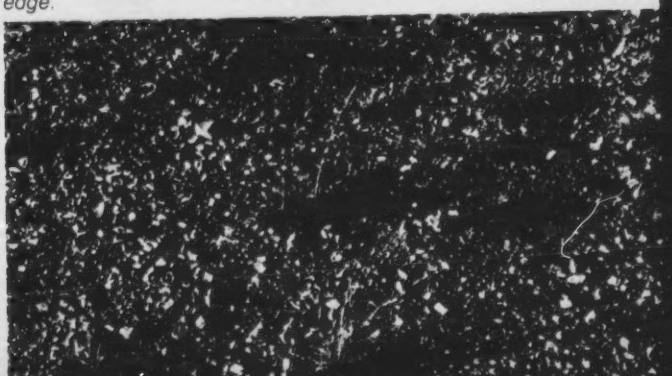
Our 'creeping plant' viewed from above.

Three plants of different shapes: the tall one is a clumpy plant, the one in front is a flat plant, and the one to the left is a bushy plant.

Our clumpy plants.

A sparse, clumpy plant community on a gravelled road edge.

A flat plant community.

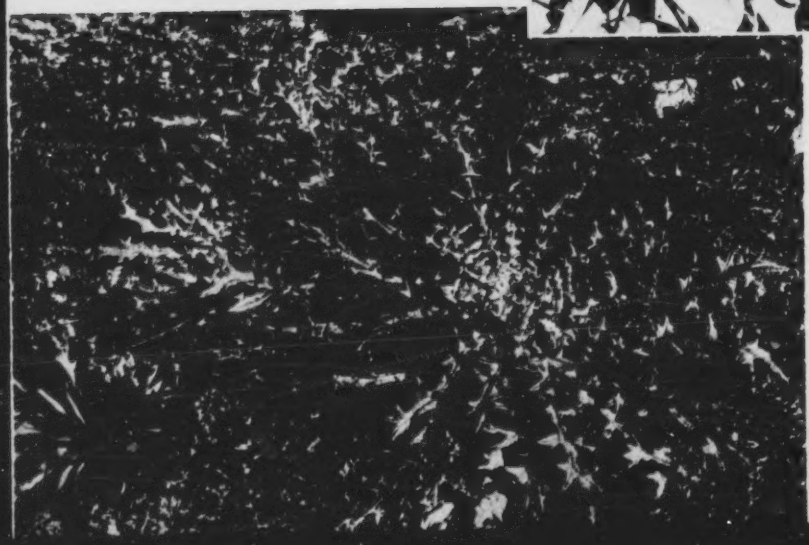


LEAVES

Oblique leaves.

Oblique and horizontal leaves.

Vertical leaves.



'Crinkly', flat leaves.

This plant occupies a rectangular space 300 mm by 200 mm by 150 mm.

SIZE AND SHAPE

This plant occupies a conical space 300 mm in height.

This plant has the shape of an ice cream cone.

This rock has interfered with the growth of this plant and so has changed its shape.

Leafy lace.

Dappled shade beneath a spreading tree.

PLANTS AND LIGHT

A long 'heavy' shadow.

Leaves casting shadows on other leaves.

The crumbled edges of a plant's shadow.

Grass leaves cast discontinuous shade.

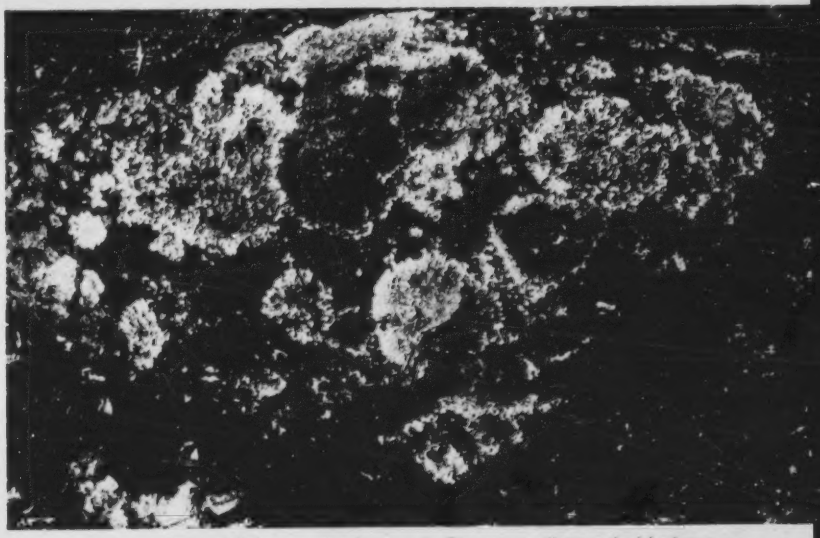
How would you describe this shadow's edge?

A tree with lichen growing on the right hand branch. The lichen is rounded and paler there.

A variety of lichens.

LICHENS AND MOSS

A rock with one variety of lichen growing on it.

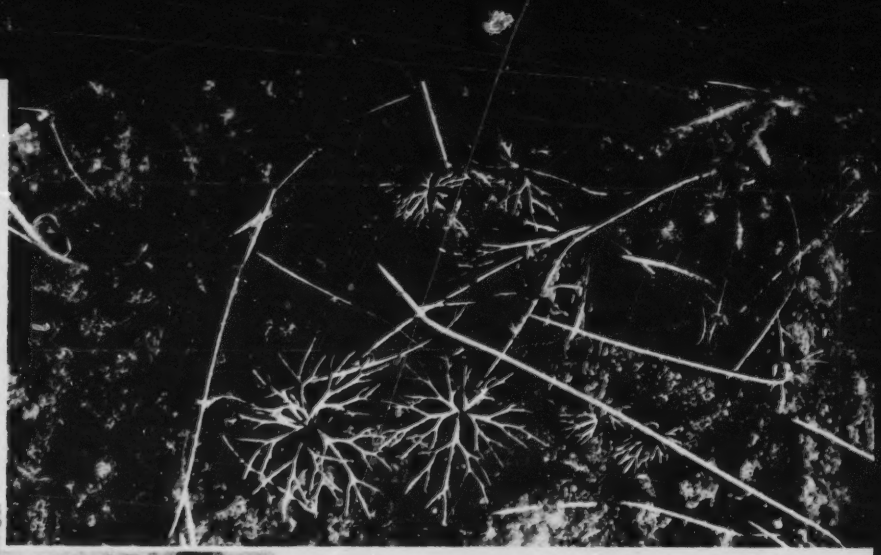


A rock with a variety of lichens growing on it. They are all rounded but are of different textures and colours.

The northern aspect of this rock is to the right. On it grows a variety of lichens. The southern, shady side grows moss (the taller plant near the rock edge) and lichens.

The southern side of this tree trunk has a jagged silhouette caused by the mosses that grow on that side only.

PLANTS AND WATER



These leaves are floating.

These plants have leaves that float on the water surface.

The bubbly mass is a floating clump of water plants with the addition of some autumn leaves.

The tracery of lines are parts of plants that live underneath water.

The Fourth Experience

Activities—

Indoors: Discuss fruits—use an apple to demonstrate.

Out-of-doors: group work: Find and collect some fuits.

Teacher reinforcement—

Discussion of briar, berry, dandelion, daisy, shepherd's purse and phalaris fruits using actual fruits.

The future—

The class is to bring in some fruits for the next experience. Thence to playground to look for more fruits—a 'guided tour' this time on the way there and back, in groups.

Language—

Botanist, plant, fruit, seed, parachute.

Natural Science concepts—

A fruit is that part of a plant that contains the seeds.

A leaf is usually a green part of a plant.

Fruits are different.

Fruits change over time.

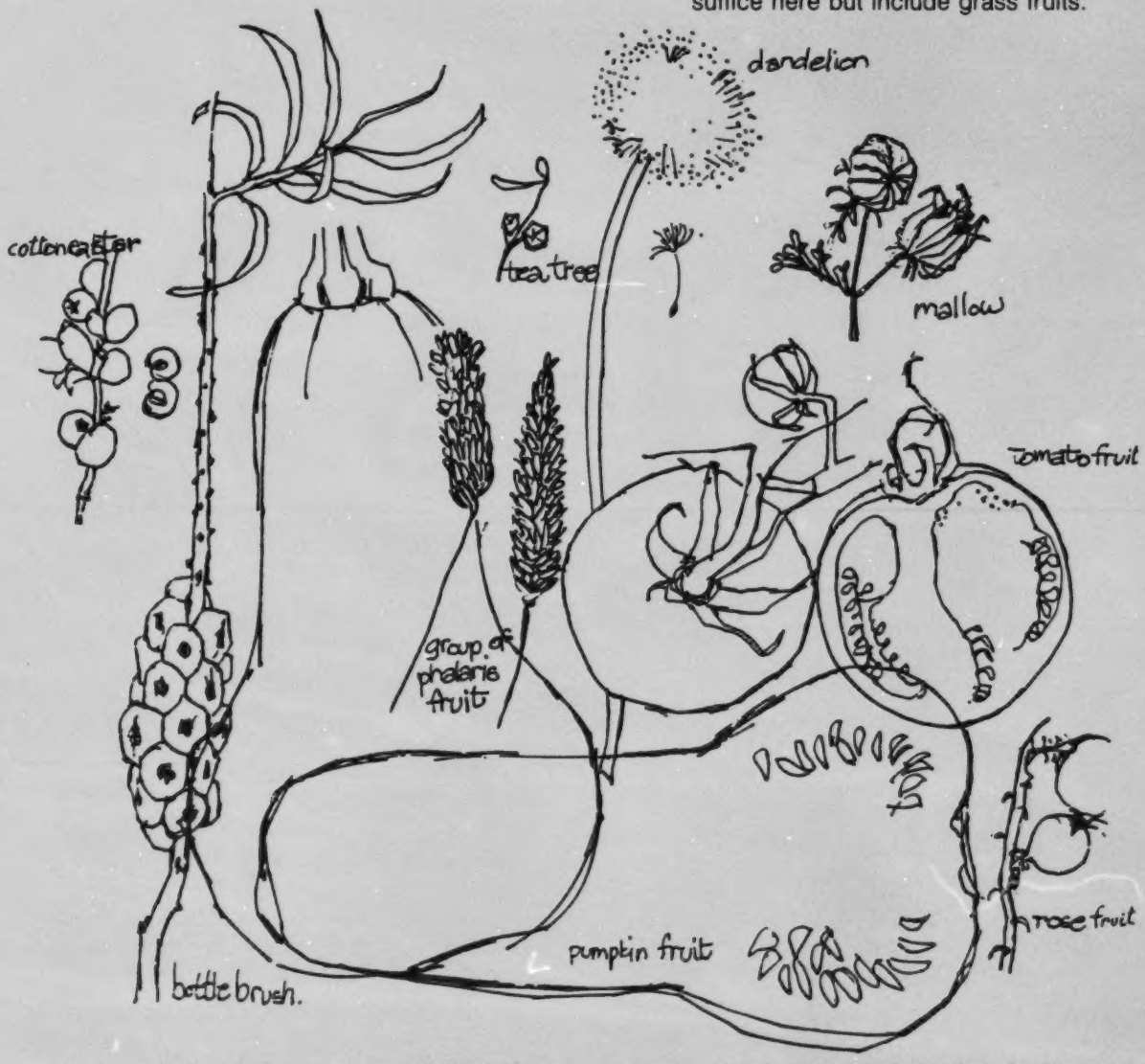
Sensory awareness—

Observation of plant parts.

Fruit may be soft and juicy or hard and dry.

Comments—

When shown what to collect, the children had no problems finding the plants. Any fruits from the school grounds would suffice here but include grass fruits.



A pumpkin fruit has many seeds; a rose fruit has only one; so have dandelion fruits one seed—but they also have a parachute that assists them in being blown around by the wind.

The Fifth Experience

Activities—

Indoors: Discuss fruits and seeds that the class has brought.

Out-of-doors: Go out and find two different, small plants that have flowers and fruits.

Teacher extension and reinforcement—

Press one whole plant of each for a wall collage.

The future—

Collect fruits and allow them to rot on the soil surface. Watch rotting and subsequent germination and growth.

Choose some trees and watch budding, flowering and fruiting over time—e.g. a wattle and a deciduous tree.

The branching habits of trees are different; buds are easy to see on the winter stems of deciduous trees.

Language—

Flower.

Natural Science concepts—

Fruit is that part of a plant that contains one or more seeds.

Plants may have flowers and fruits at the time.

Sensory awareness—

Visual discrimination of different parts of plants.

The Sixth Experience

Activities—

Out-of-doors: Dig up whole small plants from the garden or a weedy playing area, wash roots free of soil, and discuss.

Indoors: Discuss the position and shape of roots. Press them between newspaper and display.

Language—

Roots, taproot, thick, thin, long, short.

Natural Science concepts—

Plants have roots.

Similar plants have similar roots.

Life exists in the soil.

Sensory awareness—

The coldness of soil.

The smoothness of roots.

The Seventh Experience

Activities—

Out-of-doors: playground ramble to find stems of plants—their relationships.

Indoors: class discussion of stems that were collected.

Extension

Discover roots of carrots, parsnips and turnips.

Reinforce tap root system and fibrous root system.

Weekly observation of buds on Cootamundra wattle.

Observation over some months of rotting heap of pumpkins and apples, to see changes in fruit, release of seeds and germination of seeds.

The feel of stems.

The feel of leaves.

Language—

Trunks, branches, twigs, stems.

Mathematical concepts—

Small, large, tall, short, bigger than, smaller than.

Natural Science concepts—

Stems of plants have buds on them.

Buds are not always there! (so their past presence can be inferred from the plant's pattern of growth).

Plants are of all sizes.

Sensory awareness—

Detailed observation of plants.

The pattern of branching in a tree.

2. YEAR 1

FOCUS: PLANTS AND LIGHT

The First Experience

Activities—

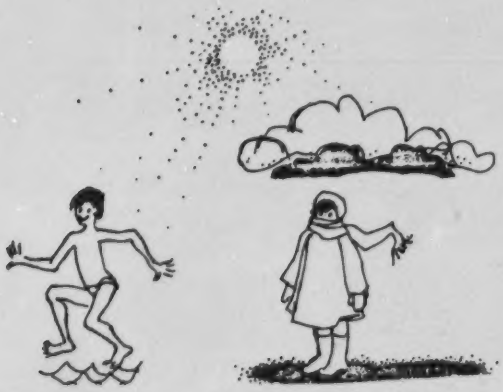
Walk to somewhere away from the classroom.
Face the wind (or sun) and feel it upon one's face; turn side on and see how one's face feels.
Stand with one's back to the sun.
What's that upon the ground?
Touch something else that makes shadows.
Stand in its shadow, then on the edge of the shadow.
Compare the lengths of shadows of children and other things.
Observe types of edges of shadows.

Teacher extension—

Discuss the reasons why shadows are formed.
Draw the children's shadows at 10 a.m. and notice that they don't fit in them at 12 noon.

The future—

Dense and light shadows.
Measuring shadows against a unit strip of cardboard.
Moving shadows—wind and time of day and of year—aspect and season.
Make indoor shadows.



Shadowed areas are colder than those lit by bright sunlight.

Language—

Warmth, shadow, edge, notched edge (e.g. brick wall), straight edge (e.g. building).

Mathematical concepts—

The same as, taller than, shorter than, longer than.

The sun's energy may be trapped in solar collectors.

Natural Science concepts—

Warmth travels from the sun to the earth.
Clouds are in between the sun and us and so make sunlight less bright.
There are daily changes in the environment.

Sensory awareness—

The feel of the wind (or sun) upon specific parts of the body.
The size, shade and type of shadows around us.

Comments—

No awareness of the feel of the wind on one side of the face only.
Children generally had no prior concept of edge.
Many had difficulties with this concept all the lesson.

The Second Experience

Whole class activities—

Find and discuss surfaces and edges out-of-doors.
Find shadows with straight edges, notched edges, curved edges; irregular edges.
Find shadows with dappled surfaces.
Find trees and shadows taller and longer than specified people.
Change your own shadow shape.

Teacher reinforcement—

Dappled—make shadow prints; look up from under a tree.
Irregular—draw and paint edges of tree shadows.
Take cardboard shapes outside and make shadows.
Clouds are in between the sun and us.

The future—

Concepts of irregular and curved edges.
The surface and edges of a shadow.
The surface and edge of a leaf.
The shadow of a leaf.
Comparison of shadow lengths with a standard strip of cardboard.
Find objects out-of-doors that we can use to make shadows.

Language concepts—

Edge, surface, irregular, dappled.

Mathematical concepts—

Taller than, longer than, trees are different sizes, fatter than, thinner than.

Scientific concepts—

The sun warms things.

Sensory awareness—

The feel of hot and cold bricks.
The feel of rough and smooth bark.
The feel of the sun upon one cheek *only*.
The pattern of light and shade in the out-of-doors.

Comments—

Too much—they could not differentiate between the feel of the sun on one side of their body and the other side.

The Third Experience

Activities—

Indoors: Make shadows with cardboard and torches or overhead projector.
Out-of-doors demonstration:
Find places with a northerly, then a southerly aspect.
Place an opaque thing between you and the sun.
Stand with your back to the thing and see if the sun shines upon your face.
Stand on other sides of the thing, always with your back to it, and see if the sun shines upon your face.
Out-of-doors group work:
Find one southerly and one northerly aspect of a building.
Indoors: Group reporting of where they have been.

Language—

Opaque, transparent, translucent.

Natural Science concepts—

Some objects are opaque and so do not permit light from the sun to travel through them. Thence translucent and transparent.
Southern sides of things have less sunshine than northern sides.

Sensory awareness—

The coldness of the south walls of buildings.
The brightness and warmth of the north sides of buildings.
The feel of the sun upon the whole of one's face.
The feel of the sun upon part of one's face only.

The Fourth Experience

Activities—

Indoors: Shine a torch on objects on the floor. Where are their shadows?
Out-of-doors: Demonstration—Find and name three types of plants on the soccer field, e.g. rosette, creeping, clumpy. (Children name them on the basis of what they perceive.)
Out-of-doors: Group work—Find and discuss shade areas caused by 'rosette', 'creeping' and 'clumpy' plants.
Indoors: Group reporting on the above.

Teacher reinforcement and extension—

Make plant shadows indoors.
Observe plant shadows over one day.
Facilitate shadow observation by placing white paper upon the ground.

The future—

Press plants and make a wall display.
Consider plants under new buildings and look for altered growth in this altered environment.
Germinate seeds under stones, or bricks and out in the open.
Place stones or cloth covers on lawn areas.

Language—

Whatever descriptive words they have used.

Natural Science concepts—

Objects have shadows underneath them.
Shadows cannot always be seen.
Plants shade areas beside and underneath them—they therefore alter the environment near them.
Plants occupy specific spaces.
Plants differ in shape.

Sensory awareness—

Perception of the shape and feel of whole plants.
Visual discrimination of dappled small shadows on the soccer field.

Comments—

Shadows of objects indoors were not easily referred to shadows of small plants out-of-doors. Hence preferably use plants in-doors.

The strangeness and excitement of the use of projectors in the classroom may have necessarily made any following experience less interesting. Hence, next time, find plant types out-of-doors, bring them inside and make shadows of them inside, the next lesson then could be observation of their shadows out-of-doors.

The Fifth Experience

Activities—

Indoors: Discuss how to be warmest out in the sun—hence how can plants maximise their absorption of sunlight?

Out-of-doors: Find a plant with leaves held straight across, and one with leaves held up and down.

Indoors: Each group to report on the above.

Teacher extension and reinforcement—

Measurement of temperatures on northerly and southerly aspects of buildings.

Measurement of temperature by horizontal and vertical thermometer.

Temperature measurement can be by comparisons of mercury lengths, not degrees.

The future—

Germination and growth of plants in the open, in cardboard cylinders, in cupboards, on the north or south.

Visit established gardens or forests.

Suggest: radish, onions, strawberries, ivy stems, etc.

Language—

Energy, absorb.

Mathematical concepts—

Straight up, straight across.

Natural Science concepts—

Plants absorb more or less energy from the sun depending upon how their leaves are held.

Energy travels from the sun to us.

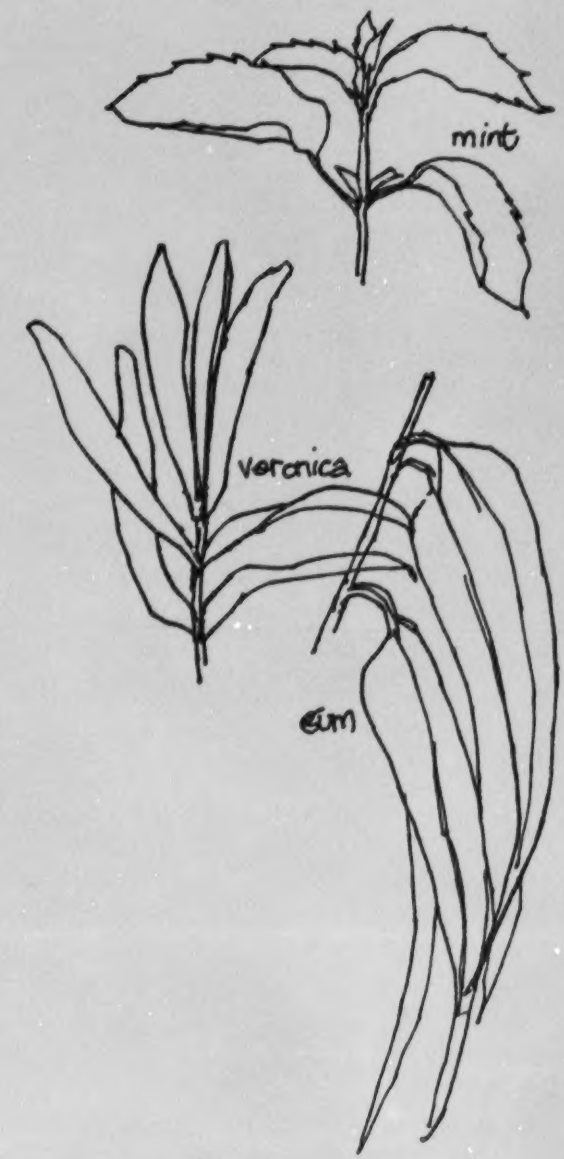
Sensory awareness—

Balance—people know whether their body is horizontal or vertical.

Observation of the ways in which leaves are held on eucalypts and hydrangeas.

Comments—

I feel that these out-of-doors experiences may be too long, particularly as the concepts here are not all concrete ones. I would also like to be involved in their recordings—these are crucial integrating activities. There was a definite loss of concentration and interest in the latter part of this lesson. We discussed this and decided upon a brief time out-of-doors, next week, perhaps twenty minutes out, followed by drawing and discussing inside for the following hour.



Plants may hold their leaves horizontally (mint), obliquely (veronica) or vertically (gums).

The Sixth Experience

Activities—

Out-of-doors: Go in groups to a specified tree and there observe whether plants or bare soil surround the tree.

Indoors: Individual recording through paintings. Group reporting on paintings.

Teacher reinforcement and extension—

North and south aspects of things.

Find things smaller than buildings—e.g. tree trunks.

The future—

Visit an area with dense and sparse timber.

Visit a garden.

Extend experimental work with plants and light.

Visit a showground. Compare plants under pine tree and deciduous tree.

Look at northerly and southerly aspects of trunks.

Language—

Vertical, horizontal, surround, bare, soil, underneath.

Natural Science concepts—

Plants sometimes grow right up to the base of a plant.

Plants may not grow underneath another plant.

Plants shade the ground near them—the shade may be dense or dappled.

Sensory awareness—

Observation of the relationships of plants one to another.

Comments—

A good lesson—the brief period outside followed by a longer period of reinforcement indoors worked well.

Initial questioning out-of-doors led children to reply with that which they thought I required, not that which was actually there.

So it was *not* an inquiry lesson, nor a creative art lesson—both were directed experiences.

The Seventh Experience

Activities

Out-of-doors: Walk to the showground.

Find a tree without leaves. Where are they?

Find a tree with leaves. Why are they still there?

Stand to the north and to the south of trees.

Observe the plants on the north and south sides of the trunks. Discuss and photograph.

Teacher reinforcement and extension—

Watch moss in cracks in rocks brought to the classroom.

Regularly observe plants underneath wet weather mats.

Place boards or bricks on lawns and observe regularly for some months.

The future—

The making of dark places in the playground—e.g. begin a compost bin with leaves and manure from the showground.

Extend board studies to different environments in the playground.

Language—

Deciduous, evergreen, algae, moss, lichens.

Natural Science concepts—

Some trees lose their leaves in winter, some do not.

Plants grow on other plants (e.g. lichens, algae and moss grow on tree trunks).

The north side of a tree trunk is a different environment from the south side of that same trunk—therefore different plants grow in these two places.

Not all plants are green.

Sensory awareness—

Observation of the world beyond the school playground; to perceive those same relationships that have been already discovered in the playground.

3. YEAR 2

FOCUS: CHANGES IN DAM COMMUNITIES

The First Experience

Activities—

Group activities (with adult, mother or teacher, in each group).

Orient cardboard with an edge parallel to my arm.

Discuss what can be seen along that edge.

Place corner of a sheet of cardboard under or beside specific plants.

Place cardboard on the area and feel e.g. rough spots, bare spots, clumpy grass spots.

'Follow the leader', the leader is to find plants as specified.

Teacher reinforcement—

Further experiences out-of-doors: sparse and dense covering of soil.

The future—

Language development to describe plants of the soccer field.

Activities designed to develop a sense of direction.

Begin seasonal plant charts.

Language—

Only the familiar—e.g. yellow flower, green plant, bare soil.

Mathematical concepts—

Taller than, shorter than, nearly as tall as, the same height as.

Natural Science concepts—

Plants of the playing fields are different.

Plants may have flowers.

Sensory awareness—

The feel of plants.

The appearance of small plants on a playing field.

Comments—

Not all children could point in a specified direction.

Children saw only distant, large and man-made objects, such as cars, poles and washing lines—so were directed to plants on the soccer field.

Language was insufficient here. How can children be helped to see the differences in plants?

Experiences here are all different. How can they be shared?

'Nearly as tall as' was a difficult concept.

The Second Experience

Group activities—

Sit in a circle and find ways to describe the plants there—the description is to be based upon what the children see and/or feel.

Press specimens in newspaper parcels whilst out-of-doors.

Whole class activities—

Share the preceding experiences.

Point to where specified plants grow.

Creep (on hands and knees) to a specified plant.

Find a creeping plant.

Teacher extension—

Specific plants will be chosen and watched over the year—complaition of seasonal flowering charts and seasonal leaf colour charts. This should include plants of the field and garden, shrubs, trees and potted plants.

Calculation of day-length from sun-rise to sun-set data—compilation of comparative charts.

The future—

Consider attempting to reach the dam by choosing 'sensory spots' to which leaders can take us—e.g. head us to the 'red berry spot', to a 'tufted plant spot'.

Language—

Dissected, ribbed, hairy, 'in and out', leaf edge, cold and warm, prickly, flat, tuft, clump, stalked, creeping, berry, rough, smooth.

Natural Science concepts—

Leaves have edges.

Leaves are different.

Plants have different shapes.

Plants may flower at different times, depending upon whether day length is increasing or decreasing.

The Third Experience

Activities—

Indoors: Whole class discussion on five of the plants found previously.

Out-of-doors demonstration: Walk as a class to different parts of the playground and the nearby roadside to see if they can find the five chosen plants there.

The children are to be questioned as to why the plants are where they are.

Out-of-doors group work: Adult group leaders are to return to the classroom along the same route in order to reinforce the above experience.

Indoors: Each group is to draw a map of where they have been; class discussion of these emphasising why the maps are the shape they are.

The future—

Integration with a unit on transport and mapping; scale correlation with dinosaurs; use of letter keys in future maps.

Natural Science concepts—

Different plants grow in different places.

Sensory awareness—

An extension of their observations of plants.

Comments—

Five plants were chosen—these were searched for at five specific spots outside—one was a carpark! They were prickly, spongy, dissected, creeping and ribbed plants (remember that the children had named these from what they perceived of the plant).

There was no questioning as to why the plants were as they were. Yet the children *must* go beyond mere seeing to reasoning. Hence inquiry questioning is to be fostered.

Map reporting was descriptive and emphasised only that different plants grow in different spots.

The Fourth Experience

Activities—

Indoors: Whole class discussion of some of the plants found previously. Introduction of concept of dominance.

Out-of-doors demonstration: Choose a dominant plant at each of four specific spots between the school and the nearby dam. Then look for animals *on* or *in* the water.

Out-of-doors group work: Return the same route to the same place continually asking questions.

Teacher reinforcement and extension—

Preparation of community maps of the three environments chosen above that are in the school playground.

The future—

Naming the above four communities—clover lawn community, clumpy grass community, phalaris community, and native pasture community.

Recognising vertical and horizontal zones associated with the dam.

Detailed dam mapping with photographs, perhaps.

Language—

Dominant, community, niche.

Natural Science concepts—

Plants grow in communities; communities are different in different places.

Places are different because different things have happened and do happen there.

Animals live in specific places, i.e. they have niches.

Sensory awareness—

Extension of observation of plants.

Development of sufficient acuity to see animals no bigger than specks in the water.

Observation of types of movement.

Comments—

Children had some problems climbing fences!

No names were given yet to these communities—to be rectified urgently.

There were animals seen above, on and in the water, but none seen on the mud.

The Fifth Experience

Activities—

Indoors: Reporting of the classes' mapping.

Out-of-doors demonstrations: Walk to, and name, the three communities in the playground.

Walk to and name the one in the paddock.

Discuss and observe vertical zoning in animals' niches near the dam.

Out-of-doors group work: Return to classroom via our four communities in groups.

Indoor group work: Draw keyed maps of where we have been.

Draw vertical zones of the dam.

Name animals seen there.

Teacher reinforcement and extension—

Group mapping of three communities in the playground.

Reinforcement of concepts of dominant and community.

Language—

Vertical, zone, map, key, darting, dragonfly, deep swimmer, shallow swimmer.

Natural Science concepts—

People change environments by digging or ploughing, by planting seeds and by covering the soil.

Nearby environments are different and support different animals.

Some animals fly, others swim and others walk on the water surface.

Sensory awareness—

Ability to visually differentiate depths in water.

Ability to see animal movements.

The Sixth Experience

Activities—

Out-of-doors: Walk to the dam via four known communities.

Whole class discussion of native pasture community and of gum and peppermint trees.

Group discovery of three new communities near the dam—two to be named by the group, the third to be a water community.

Groups to feel the barks of two trees on the way back to the classroom.

Indoors: Whole class discussion of the three new communities.

Whole class reporting of their mapping of three known communities.

Teacher extension and reinforcement—

The slope of the land.

'Above' means walk up the slope.

'Below' means walk down the slope.

The future—

Children need the experience of mapping the three dam communities actually in the field.

Deduce that water flows down slopes.

Language—

Community, dominant, algae, swamp, fallen over, flowing, slope.

Mathematical concepts—

Above, below.

Natural Science concepts—

Some plants live entirely submerged in water.

Plant communities are different in different places.

Water flows in certain channels only.

Flowing water may change the shape of plants.

Sensory awareness—

The general feel of bark (rough and smooth).

The specific feel of bark (smooth with lumps, different types of roughness).

The directional feel of leaves (leaves may be smooth one way and saw-toothed the opposite way).

Extension of observations in dam area.

Comments—

There was no concept at all of 'above' and 'below' the dam.

The discussion indoors elicited few correct recollections of the position of the new communities with respect to the dam.

The children enjoyed finding 'slime' (their word), but found it really difficult to pick up *only* slime.

A TEACHER'S VIEW

The following lesson records of the kindergarten teacher illustrate how the ministeps were put into practicle and some of the results.

14 April

1. Sat on ground—discovered colour.
2. Sat on green.
3. Sat on place where there is no plant life.
4. Rub it—what colour?
5. Find something yellow.
6. Word *soil.*
7. Words *flat, slope.*
8. Collect stones.

Follow-up

Classroom

1. Weigh the stones. Some groups of stones have 'more mass'. Some groups have 'less mass'.
2. What colour are the stones?
   What else did we see the same colour as the stones?
   Answer: Soil.
3. Where did we see the soil?
   Answer: On the 'bare' ground.
4. Look for bare ground at home—e.g. driveways, footpaths, gardens.
5. Bring a stone from home and compare with those we found in the playground.

Outside

1. Do the complete lesson again.
2. Walk in a certain area only stepping on 'bare' ground.
3. Walk—stepping on green things.
4. Walk—stepping on white things.
5. Count all the yellow things, inside a hoop or a rope.
6. Take a ball—place on flat ground. Place on a slope and watch—what happens?—why?
7. Find a stone bigger or smaller than the teacher's.
8. Find a set of stones—count.

21 April

1. Discovered a hole in the ground.
2. Went into groups to look for more holes.
   (a) Did they have anything in them?
   (b) What colour was in the hole?
   (c) Are there any cracks in the soil, particularly in the holes?
   (d) Do colours differ in the holes?
   (e) Size of holes—e.g. child's foot, the size of several children standing, lying.
3. In groups: looking for bare soil; colours differ; area of bareness.

Follow-up—outside

1. Go out to a different area and search for holes in the ground.
2. Find different size holes—how many children's feet or children fit.
3. Look for 'shallow' and 'deep' holes.
4. Does your foot cover more space than the hole you found?
5. What is in the hole?

28 April

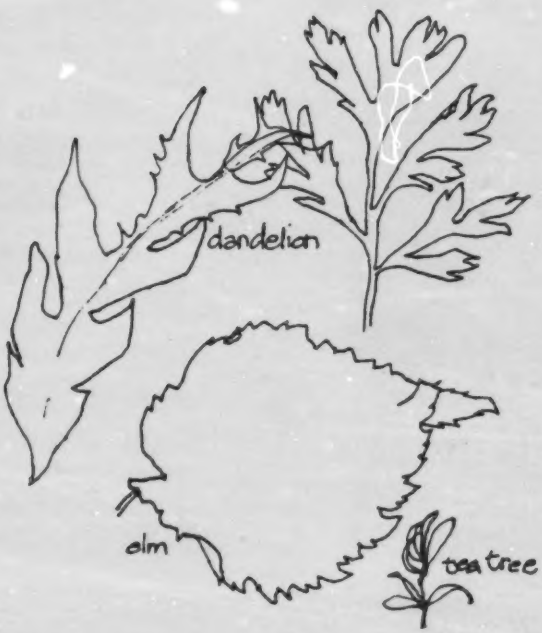
Aim: To find leaves of basic four shapes—square, circle, rectangle and triangle.

1. Took shapes from attribute blocks—four different shapes.
2. Talked about the aim of the lesson.
3. In groups—went outside to find the leaves—one of each shape.
4. Brought them in and compared them with the basic wooden shape.

Conclusion: Discovered that although the leaf is similar it is not an exact shape.

Follow-up

1. Stapled the leaf between paper and pencil'ed a leaf rubbing.
2. Traced in another colour the similar geometric shape over the leaf rubbing.
3. Looked for more leaves—compared size—e.g. long and short, compared colours.
4. Some leaves lie on the flat ground and some stand up.



Leaves have different edges.

9 June

Class group

1. Discussion of parts of a plant—leaves, flower, buds, stem, fruit.
2. (a) Outside to dig up two plants and return them to the classroom.
   (b) Wash and place on a sheet of newspaper to dry.
3. Compare the plants on the newspaper—comments from children.
4. What parts of the plant can you see?
5. What parts of the plant could you see before you dug it up?
6. What parts could not be seen before digging?
7. Compare the roots—colour—size, thick or thin, long or short.
8. When you feel the roots what do they feel like?

Flowers are of many shapes, sizes and colours; they may be held on separate stalks (e.g. abelia and lowender) or there may be many held together on the one stalk (e.g. phalaris and clover).

Follow-up

1. Press the plant roots found between newspaper.
2. When dry, arrange and label on chart. Tap roots are fat; fibrous roots are thin.

23 June

1. Discussion of parts of a plant.
2. *Question:* Can you tell me all the plants you know that grow outside?
3. Find some tall plants. Find some small plants. Look at the stems. Stems have buds. What do we get from a bud?
4. Look at the stems—sometimes they are called trunks and branches.
5. Notice the way the branches shoot out in patterns.
6. Class report about parts of a plant.

29 July

Aims: (i) To compare sizes of stems.
(ii) To bring some back to class.

Outside

1. Look for stems of plants.
2. Compare sizes—e.g. Can you put your finger around them? Can you put your arms around them?
3. Find a variety of stems and if possible bring back to the room.

LOOKING TO THE FUTURE

No course is complete without some attempt at evaluation—the school's judgment of this course was an enthusiastic one. The staff saw their classes actually taught a unit of work out-of-doors; they could see their improvement in attitudes to work, in the degree of sensory awareness and in skills of observation; and they could discuss, and question, and be involved in the work as it was planned and executed. They regarded my availability and my sequential teaching as crucial to such a course. My role changed from that of being the person who did all the talking, deciding and doing, to that of being the person with whom decisions were taken, then either I, or the staff, would teach out-of-doors and lead recording sessions indoors. The last two weeks of the ten week in-service course were spent working with the staff using a conceptual framework to develop further units.

ACKNOWLEDGMENTS

To Andrew, David and Robert, whose lives intermingle with mine and who continually enrich my perceptions of the world.

To Helena Basden (my photographer) and Faye Porter (my artist) whose skills have enhanced this report.

THE ENVIRONMENT WEEK FESTIVAL AT PRINCES HILL HIGH SCHOOL, 1978

John Stirling

PREAMBLE

A festival has a positive connotation not often associated with environmental events. It is a highly visible activity guaranteed to go beyond the bounds of the school and into the community at large. Such was the aim of a Victorian school which worked with the local residents' association to run highly successful festivals in 1978 and 1979. The idea for the festival came from some Year 10 students who, through an environmental studies unit, were trying to increase the awareness among their fellow students of changes occurring in their local area. Feeling deflated by the lack of response to displays around the school they decided that a concentrated week of activities might be more rewarding for the energy expended. The organisation and the trials and tribulations of running such an event are outlined in detail.

One-off events such as this are a common approach to topics not included in the normal curriculum. Does this detract from them in the eyes of the students and the community, or is the effect just the opposite? The reader is left to judge.

INTRODUCTION

The aim of this account is to detail the planning and organisation required to hold a week-long environmental festival to link educational and environmental themes for students and the wider community.

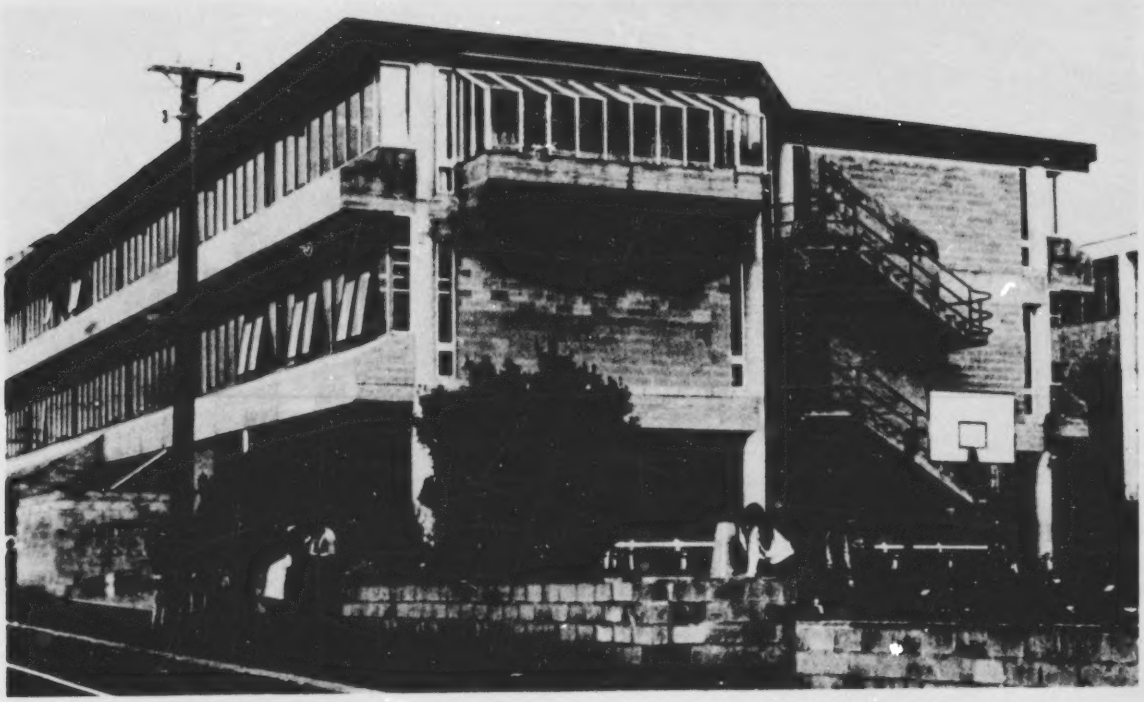
Environment Week was launched at Princes Hill High School during October 1978. Students, teachers, environmentalists, and the local community participated in a variety of activities relating to matters of local and global environmental concern. The purpose of the week was to draw attention to what is happening to the environment and what might be done to improve it.

The various activities which occurred during the week were designed to highlight the need for an awareness of and sensitivity to natural and man-made environments. Emphasis was placed on informal educational activities. A variety of films, guest speakers, excursions, static displays, environmental stalls, and pamphlets were available to teachers and students. The local people, through the long established resident action group (the Carlton Association), organised a public meeting with the theme 'Carlton—An Environment Under Threat' as well as a community day on the Sunday to conclude the week's activities.

For Princes Hill High School, Environment Week was organised to provide a fresh approach which would assist individuals and groups within the school to develop a greater sense of responsibility and urgency regarding environmental problems.

BEGINNINGS—THE GERM OF AN IDEA

Princes Hill High School is situated in inner suburban Melbourne in a community which is threatened by a variety of features which directly affect human happiness and the quality of life.



Princes Hill High School.

One such feature is the intrusion of traffic. This severs the community from shops, schools, and recreational activities. Freeways to accommodate the ever-increasing traffic pose a further threat. During the week commuters cause parking blight. Patrons of the nearby stadium cause blight at the weekend. The expansion of institutions such as Melbourne University and its associated colleges, hospitals and industry, into residential areas is a further problem as are the intensive construction of flats which are destroying the character and charm of an old suburb, and the shifts in population which must occur when property values increase rapidly because of the attractiveness of the area. Finally, there is a general lack of open space for passive and active recreation.

The school is situated on a pocket-handkerchief block of less than a hectare, most of which is occupied by buildings. The front street is taken over by the seven hundred students during lunch and recess. Princes Park, a large reserve situated a block away, provides an attractive area for many students at midday.

Students come from a vast collection of backgrounds. Around forty nationalities are represented. Socio-economic and home environments range from comfortably rich to extremely poor, and from housing authority high-rise flats and simple terrace dwellings to larger, more substantial homes.

The local community has a tradition of being vocal and the Carlton Association, an influential resident action group, has been successful in keeping check on a variety of threats to the area. Through their actions, a number of schemes to enhance the suburb have been introduced.

Over the years the school has contributed consciously towards an improved environment for the students attending the school. A school camp was established in 1970 in a bush setting near Mount Buller. All students have an opportunity to attend. The school building, altered extensively as a result of a destructive fire in 1970, won architectural awards and is carefully maintained. The school is now extensively used after school hours as a community facility.

The author, the co-ordinator of the Art/Craft faculty, has been at the school since 1968 and is responsible for the development of its buildings and grounds. He is also involved with the local community as a councillor, a parent and an active member of the National Trust. Because of his concern for the environment and the apparent lack of awareness of students, concerning ways to preserve and enhance the environment, he introduced a course of study for interested Year 10 students on the theme 'Our World, Our Environment: Who Cares? Do You?'

These Year 10 students soon realised that,

while they showed concern for a range of environmental issues relating to the school, the local area, and beyond, many others did not. It seemed important to them that the rest of the students and members of the local community were more actively interested in the environment. But response to initial attempts to inform the rest of the students about environmental matters (mainly through visual displays around the school), was generally poor. Consequently, it seemed better to use their energies in the preparation of a concentrated week of activities where established environmental groups could assist in an Environment Festival.

On 10 May, 1978, the following invitation was sent to various organisations asking them to attend an inaugural meeting to plan 'Environment Week':

Dear Environmentalist,

During Term 3 (possibly between 2nd and 8th October) we intend to launch 'Environment Week' at this school.

It is hoped that during this week a range of environmental activities will occur in the form of films, displays, workshops, environmental happenings, e.g. tree planting, demonstrations, walking trails, guest speakers, environmental stalls and so on.

Some other thoughts for the week include:

(a) Declaring each day a particular theme day—
Recycling day
Conservation day
Transportation day
Alternative energy day, 'Sun Day'

(b) Involving the community as far as possible in participating in the Environment Week:
(i) continuing the week over the weekend and evenings;
(ii) actively participating in the planning of the week's program.

(c) Pre and post Environment Week Activities—planning, press coverage, etc.

We are concerned that insufficient exposure is given to environmental issues. Environment Week may be an important way to impress students and the public about environmental issues.

For the week to be a success it will depend on the enthusiasm of environmental groups to participate in the planning and organisation of Environment Week.

We would be delighted if you could send along a representative to the inaugural meeting of Environment Week to be held in the Princes Hill High School Library on Tuesday, 6th June, at 3.00 p.m.

Please contact me by Monday, 5th June (World Environment Day), if you are able to attend the meeting.

Yours faithfully,
JOHN S. STIRLING

PLANNING AND PITFALLS

Choosing the most appropriate week seemed to be an important starting point. Sufficient time beforehand was needed to plan the festival and consideration had to be given to students preparing for end-of-year exams. Many weeks were also earmarked for events such as curriculum planning days, parent-teacher evenings, conferences, school excursions, and camps. A check on local community activities also suggested some weeks to avoid. The Principal supported the proposal and agreed to provide finance in the form of postage, telephone calls, and a working budget of $200. Some secretarial help would also be provided by the office staff.

While attendance at the first planning meeting was low for a variety of reasons, those present were enthusiastic about the prospect of an Environment Week festival. Proposals included:

- The week's activities should involve not only students attending Princes Hill High School, but also the local community and various environmental groups.
- Activities should take place during school hours, evenings, and weekends.
- Each day should emphasise a particular theme: e.g., Animal Day, Recycling Day, Transportation Day, Sun Day, Community Involvement Day, Conservation Day, Anti-pollution Day.
- Activities should take the form of films, excursions, demonstrations, displays, workshops, area improvement schemes, guest speakers, essays, art work, and surveys.
- Staff should be invited and encouraged to incorporate aspects of environmental activities into their curriculum for that week.
- That, in order to effectively plan the festival, the following sub-committees should be set up: Publicity, Exhibitions, Curriculum, Community Education, Resources, Program Organisation.

Another important exercise at this first meeting was to compile a list of possible activities for the week under the following headings: Excursions, Films, Guest Speakers, Surveys, Other Interest Groups, Community Participation, General Ideas. Felt pens and large sheets of white paper with the above headings were provided for this purpose and an extensive and exciting range of ideas resulted.

Two subsequent meetings were attended by only small numbers of people and it became obvious that the committee and sub-committee

structure would not work. This approach was therefore discarded.

Meanwhile the librarian had established display boards listing various aspects of the organisation and created a cross-referenced card system of individuals and organisations involved in the proposed festival and the likely activities. This became a valuable planning device.

By the third meeting it was apparent that if the week was to be a success then details had to be finalised quickly: Term II holidays were imminent, and after they had finished, Environment Week was only a month away.

SELLING THE IDEA

Once it was known what could be provided in the form of films, guest speakers, excursions, and other activities, a large display board was prepared adjacent to the staff room and library for the information of both students and staff. The display included 'The Belgrade Charter' (a framework for environmental education), the times guest speakers would be available, what excursions were planned, the film program and a copy of the current weekly timetable.

A half-hour staff meeting was convened in the week preceding the Term II holidays to explain fully activities organised for Environment Week, and how staff could arrange activities for their classes. It was clear that the week was not intended to replace normal class activities. Once the details were understood the method of selecting activities was explained.

The current weekly timetable became a useful planning device. Once staff selected activities, it was a simple matter to superimpose the booking arrangements onto the current timetable. Within a week or two arrangements had been completed.

The Carlton Association produced a poster announcing the Wednesday evening public meeting and the Community Day planned for the Sunday. Information to parents was conveyed via the weekly newsletter; in this case the painting teacher produced a delightful cover design for the publication. The local newspaper made a brief mention of Environment Week and Community Radio 3CR carried interviews for its 'Habitat and Heritage' program. Information was supplied each day to teachers and students via the Daily Bulletin. Various handouts were made available to teachers so that they could devise their own areas of study around the theme of 'our environment'. One included a list of project ideas developed by the Conservation Council of Victoria.

Environment Week Newsletter.

THE WEEK IN DETAIL

A teacher's aide and library technician were organised as projectionists to show the fifty films booked for the week. A number of displays arrived on the previous Sunday afternoon and were erected around the school to set the festival mood. The Ministry for Conservation supplied displays on National Parks in Victoria, archaeological findings in the State, and two large plastic modular exhibits depicting the habitat of two species of birds. The Town and Country Planning Board provided a display on planning considerations for the Macedon Ranges (an area some 70km from Melbourne constantly under pressure by developers). One of the State Colleges assisted with a display on environmental occupations, a solar energy display with actual working models of boats, radios, cars, and a display on recycling. The art teacher presented a display in the form of a diorama on wildlife in inner suburbia. A commercially manufactured solar hot water collector was set up in the library. Various posters concerning the environment were displayed around the school.

Most students had an opportunity of viewing all of the many excellent films available for the week but an important aspect of planning was to ensure that they did not see the whole or part of the program twice. This did not always happen as some teachers took their class to a film program without first booking. And while the films were significant in their messages, their impact was diminished because of inadequate pre- and post-film activities.

While films became the dominant activity for the week during normal classroom time, the various guest speakers arranged proved to have greater impact. On the Wednesday morning a representative from the Melbourne-based 'Freeway Action Group' spoke to two combined classes on the impact of the motor vehicle and freeway construction. Mrs Pritchard discussed the progress of the construction of the Pritchard steam car and its energy-saving virtues to approximately eighty students on Wednesday afternoon. On Thursday an experienced forester, spoke to a senior class on the changes over the years in the area where the school has its camp. The talk was illustrated with a 1940s film of the area. Three representatives from the Bicycle Institute discussed bicycle safety, security, and present and future planning proposals for cycle tracks around Melbourne. Kevin Heinze, a well known gardener and television personality, captivated approximately two hundred students when he spoke on the care and value of plants. Kevin demonstrated how to pot plants, commented on the reasons why many of the indoor plants around the school were looking poorly, and made some excellent statements on his attitudes towards a better lifestyle.

Lunch times provided an opportunity for students to view the displays around the school but it took a few days before students and teachers became fully involved with the exception of the excellent working model on solar energy which was situated in the library. This particular display was instantly popular. It was supervised by its maker and students were keen to seek information from him on solar power.

Teachers recognised the value of some of the display material and organised assignments for their classes based on the displays. As these could only remain in the school for the week, however, it was often difficult to plan complete assignments.

During Wednesday lunch time students from the environment class organised the various environment stalls in the canteen and many teachers offered their help. An appeal had been made a month previously for second-hand books, clothing, ornaments, household objects, and other items. Plants were obtained from the State Schools' Nursery for sale and a number of environmental groups had publications, car stickers, and buttons for sale. Proceeds were used to assist the funding of the week and the purchase of library books devoted to environmental issues. Profits were around $150.

Some excursions were organised for the

Students Selling Buttons, Car Stickers and Publications at Lunch Time.

Students on the Puzzle Trail in the Rear Lane of the School.

Observing Details of a Tree or the Puzzle Trail.

week. One class spent an afternoon at the zoo investigating endangered species. Two classes were introduced to an appreciation of aspects of our built heritage through a well established walking trail in South Melbourne. A walking trail in the form of a 'Puzzle Trail' was devised. This highlighted a number of natural and man-made aspects in and around the school. Quite a few forms from various levels used the trail and it proved to be a great success. Students and teachers alike were surprised to find that a wealth of information and interest can be found in the vicinity of the school.

Community-organised activities included a Wednesday morning meeting and a Sunday Community Day. An evening meeting only attracted around forty people, despite the excellent program of speakers. Three speakers discussed various aspects around the theme 'Carlton—An Environment Under Threat: Past, Present, and Future', and illustrated their talks with the aid of slides. The planned bicycle tour of Carlton did not eventuate due to the lack of interest. While the Community Day was not as well attended as hoped, it was a fitting conclusion for the week. The Carlton Association operated several stalls and a number of environmental groups organised displays and the sale of publications. The people who attended seemed to enjoy having lunch at school and discussing matters relating to the environment.

Community Day Discussions.

SUMMING UP

Due to the success of the 1978 festival, a second took place in 1979. The experience gained from the previous festival proved beneficial. Funding from the Schools Commission provided a secretary. A previous member of staff who lived in the Carlton area was appointed to this position. She was able to spend a considerable amount of her time contacting organisations, where possible personally, and this proved to be the most worthwhile way of gaining assistance. It was evident however, that many organisations, particularly government departments, were unable to assist as much as they would have liked. While it was possible to have displays delivered in 1978 most had now to be collected. Where previously there seemed little difficulty in organising guest speakers, many had difficulty gaining release from their work. The secretary also had the time to liaise with individual members of the school staff to plan for their specific areas of interest. She was able to advise them on suitable films, speakers and activities.

Secretarial help allowed the organiser to refine and expand the overall festival. A more professional approach was made in presenting information. For example, letterheads and note cards were printed. He was able to speak with key people in the environment movement to elicit their interest and support, and was helped by the Education Officer for the Ministry for Conservation, who conducted an in-service discussion for teachers on environmental education one afternoon and gave generous assistance in organising speakers and displays.

An attempt was made to involve other schools. The Environmental Teachers Association was contacted for a list of schools teaching environmental studies, but none seemed able to participate.

Despite this, awareness of environmental education is being raised in Princes Hill High School with continuation of the festival. It is encouraging to see that teachers who were previously uninvolved are now drawing on the resources provided through Environmental Week. Future festivals should make Princes Hill High School even more committed to environmental education.

ACKNOWLEDGMENTS

I acknowledge with gratitude the assistance of Robin Youl, Daphne Rogan, Paul Buchanan, Wally Buhaj, Walter Povey, Laurie Wilson and my wife, Ruth Stirling for her constant help and support.

Organisations Contacted for Environment Week

- Zoo Education Service
- Victorian Environment Centre
- Ministry for Conservation
- Gould League
- Swinburne College of Technology, Science Education Centre
- National Trust of Australia (Vic.)
- Department of Science and the Environment
- Environment Protection Authority
- Emerald Hill Liaison Committee
- Australian Heritage Commission
- Urban Renewal Advisory Committee
- Project Jonah
- Town and Country Planning Board
- The Conservation Council of Victoria
- Patchwork Books*
- Gas and Fuel Corporation
- Citizens Against Freeways
- State Electricity Commission
- Carlton Association
- Environmental Studies Association of Victoria
- Anybody's Cycle Club
- Australian Conservation Foundation
- Inspect
- Alternative Technology Cooperative
- Friends of the Earth
- School Forestry Branch, Education Department
- Environmental Teachers Association
- Koonung-Mullun Forestry Association
- Soil Conservation Authority
- National Parks Service
- Melbourne City Council, Superintendent of Arts
- Elgin Scrap Metals
- Centre for Environmental Studies, Melbourne University
- C.S.I.R.O. Solar Energy Laboratory
- Melbourne State College, Environmental Sciences and Design Departments
- Shire of Mornington
- State Schools' Nursery
- Pritchard Steam Car
- Forestry Commission of Victoria, Environment and Recreation Branch
- Bicycle Institute of Victoria

ENVIRONMENTAL GUIDELINES FOR SCHOOLS

Andrew Tidswell

PREAMBLE

The informal or hidden curriculum in schools is something that must be considered if environmental policies are to be effective in promoting an environmental ethic in the school community. One facet of this curriculum is the influence of school buildings on the behaviour of both adults and students. In this article, Andrew Tidswell looks at ways in which the functioning of buildings can be used to reinforce positively the messages of the classroom as well as demonstrating to the community the school's environmental awareness. The importance of good management practices as well as modifications to the existing building are considered. Considerable opportunities for integration with the formal curriculum are implicit in these considerations which focus particularly on energy conservation.

INTRODUCTION

First we shape our buildings,
thereafter they shape our lives
(Winston Churchill).

When people are involved in the creation or modification of their surroundings they feel more comfortable and take much better care of them. This is as true for children as it is for other members of the community. Formal education plays a large part in their lives. School buildings are a major part of that influence, yet the design of a school usually stops the day after it has been officially built. It is important and desirable that the users of a school should continue the design process by adapting, improving and personalising the facilities to make them more pleasant and comfortable and more in tune with changing educational needs. Practical experience of this kind can create an awareness of environmental issues, an understanding of their nature, and an empathy with the natural environment as well as helping to develop skills in environmental management.

The guidelines that follow are directed at the large number of existing schools within Australia and are aimed to:

- enhance the impact that school buildings have on the learning process
- harmonise school buildings, and the way they function, with the natural environment
- demonstrate to the community how schools can become centres for environmental awareness and expertise
- conserve the energy and other resources consumed by schools.

Some of these guidelines are within the scope and ability of the school to undertake. Others are the province of the education authority.

The guidelines are a collection of ideas and directions; they are not a prescription for action. They focus on the conservation of energy and to a lesser degree on the conservation of other resources such as paper and water. Some, such as making use of natural daylight, fresh air, indoor-outdoor relationships, local climate and a diversity of colour, texture and form, may seem

pretty obvious in these days of heightened awareness. The ideas within the guidelines are easier to implement if considered as part of a school's environmental policy where their contribution can be seen as part of a larger plan. Enthusiasm, finance, materials and free labour are then easier to obtain and maintain during the implementation phase.

Now is the time to look at each school individually and modify it to make it a comfortable, pleasant and effective place in which to learn. Two steps are necessary. The first is the introduction of sound management practices into the daily operation of the school. These can be done quickly and with little cost. The second, the modification of existing buildings, equipment and grounds will take time and money to implement. Both are worth the effort.

GOOD MANAGEMENT PRACTICES

In their daily operation schools, consume large quantities of energy, water, paper, and food as well as materials such as wood, plastic and metal. Careful management can often reduce this consumption and thereby save the school or education authority considerable money. More importantly however, the conservation of resources, i.e. the prolonging of their useful life, helps maintain options for the students and the children of those students.

The following measures can contribute to the education of your students both directly or indirectly.

1. Generally

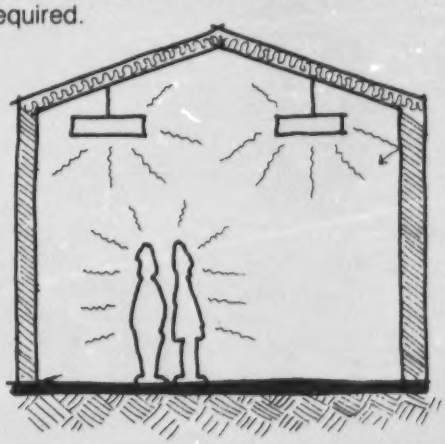
- Encourage people to wear clothing appropriate to the weather. Clothing should complement the body's ability to deal with temperature changes. Natural materials such as cotton and wool are preferable to synthetics. Investigate with the students and the parents the most suitable materials and types of clothing for your particular climate.

HOT/DRY	HOT HUMID	COLD
loose flowing garments give controlled air movements next to the skin, but insulate from the hot outside air.	minimum clothing to give maximum exposed skin area to allow perspiration to evaporate and cool the body.	clothes to trap air layers for insulation-natural fibres especially wood are best farbic to do this.

- Use outdoor areas whenever the weather is suitable (as it is much of the year in many parts of Australia).
- Find out from the maintenance authorities how to operate heating, cooling and ventilation equipment in the most efficient and effective manner. Request simple and graphic operating instructions. Find out how the equipment should be kept in optimum working order, and notify the appropriate authorities of any malfunction as soon as possible.
- Conduct an energy audit through the school (see page 62).

2. Heating

- On cold days turn heaters on as early as possible in the morning. Turn the thermostat down or the heaters off as soon as the temperature reaches a comfortable level, as the heat generated by people can often maintain a comfortable level without further heating. A little experimentation will soon determine the amount of heating required.



people and lights generate heat

- Heat the space to the degree required by activity. (The greater the physical activity the less artificial heating required.) Consider holding some vigorous activity first thing on cold mornings to warm people.
- People feel more comfortable in cold weather when they are closer together. Investigate ways to take advantage of this. *Suggestion—Arrange desks in closer groupings and use smaller rooms where this is possible.*
- Generally during cold weather, keep doors, windows and vents closed to prevent the heat from escaping. Any fresh air for ventilation should come in at a low level, and as close to the heater as possible.

ENERGY AUDIT

An analysis of the electricity consumption in a school should be obtained to accurately pin-point areas where reductions in use can be made. The electricity authorities have the equipment and expertise to undertake this analysis which consists of itemising the details of the size, consumption and duration of use of all equipment and lighting. Analysis of this information shows up specific areas of high energy consumption, and where economies can be made to reduce wastage.

A sample of part of an energy audit on a school is reproduced below. It assumes consumption for 1640 hours per annum.

Lighting	Intensity	kW installed	kW in use (during test)	approx. annual consump.	approx. security consump.	approx. total annual consump.
Science	low	5.5	5.0	8 200	8 000	16 200
Library	high	14.2	14.0	23 000	27 500	50 500
Admin.	OK	2.3	2.0	3 300	3 300	6 600
Gymnasium	OK	4.5	4.5	22 700	3 300	26 000
Junior School	OK/ high	13.4	12.9	21 000	19 500	40 500

Power	appliance kW installed	kW in use (time of test)	approx. annual consumption
Home Science	52	18	29 500
Art/Craft	14 @ 50%	6.3	38 000
Canteen	22.5	6.3	10 000
Air conditioning	10.5 @ 75% 10hr	3.0	16 000
Ventilation	12 @ 100% 12 hr	12.0	30 000

From the example it can be seen that security lighting is a large consumer and adjustments made to this could conserve significant amounts of electricity.

- Only have heaters working in rooms that are occupied (if the equipment allows this control). If possible schedule activities to enable continuous use of spaces that are already at the correct temperature.

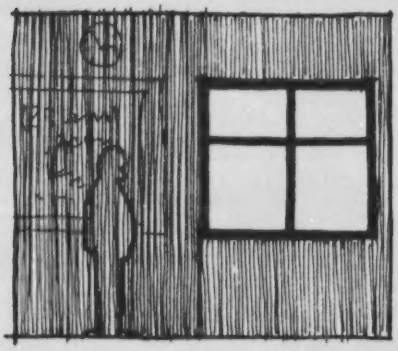
3. Cooling

- Where cooling equipment is installed, use it only when the temperature is too hot for comfortable working, and only to reduce the temperature to the minimum necessary to become comfortable. It should not be necessary to run such equipment continuously, except on particularly hot days.
- Often ventilation (air movement) is all that is required to make conditions comfortable. On hot, still days when there is no breeze, the fans on cooling equipment can be run to produce adequate comfort much more economically than operating a cooling cycle (if equipment lends itself to this operation). People feel more comfortable in hot weather when they have more personal space and larger room volumes. Consider how this could be achieved.

  Suggestion—Use larger rooms and more scattered desk layouts where buildings allow this to occur.
- Effective ventilation can provide adequate natural cooling, obviating the need for any mechanical cooling, as well as providing necessary fresh air. Air should be directed over the skin to give the most comfortable conditions in hot weather, by adjusting window openings. In cold weather ventilation should be directed away from people.
- Use windows and doors to take advantage of desirable breezes whenever possible. Generally, windward and leeward openings should be the same size to get the best cross ventilation. (A later section deals with modifications to improve ventilation.)

4. Lighting

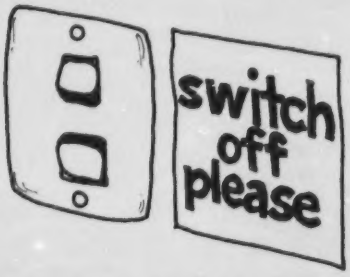
- Use natural daylight whenever possible. Turn the lights on only when there is not enough daylight for the particular task. South facing windows provide the best daylighting as it is more evenly bright and has less glare.
- Arrange working positions (desks etc.) to take best advantage of daylight. Tasks needing the most concentration should be nearest to windows. The light should come from the side, as the glare from front



the glare from looking directly at windows makes the room appear darker than it is

windows makes it appear that the room is darker than it really is.

- Get into the habit of turning the lights on only when necessary, and turn them off when leaving a room. Contrary to popular belief it is not more efficient to leave lights, even fluorescent ones, on rather than turn them off and on. Stickers adjoining switches are a good reminder.



signs next to light switches

- Where the switching allows it, turn on only the number of lights required for the task.
- In areas where a low light level is adequate (stores and corridors), replace all but the minimum number of lights with 'blown' globes. Fluorescent tubes can be partly unscrewed to stop them working, but make sure they cannot fall out.
- Fluorescent lights are much more efficient than incandescent and should be used where there is a choice.

5. Appliances

- Use electrical appliances such as photocopiers, printing machines, hot water urns, kilns, exhaust fans, fume cupboards, television sets, other audio-visual equipment, technical studies/industrial arts machines and home economics/domestic arts appliances only when needed for the particular task.
- When purchasing new equipment, consider their efficiency, energy consumption, maintenance and durability as well as the suitablity for the task.
- Educate other users of school property, such as cleaning staff and community groups, to use only the minimum number of lights and equipment necessary for their task, and to turn them off when they leave.

6. Water

- Grassed playing fields require considerable amounts of water to keep them in good condition during summer. A regular deep soaking is the best way to ensure strong healthy grass, in preference to more frequent light waterings. During hot weather, grass is best watered in the late afternoon, or during the night to reduce the evaporation.
- Where a lot of items have to be washed, use a sink full of water instead of running tap.
- Leaking taps, cisterns and fittings should be fixed promptly to reduce wastage of water.
- Reduce the water used in flushing toilets by adjusting the cisterns or by placing half bricks or clean rocks in them to reduce the volume of water in them.

7. Paper

- Recycle paper by using the blank back of old sheets for memos, rough drafts, etc.
- Print only the required number of copies of notices etc.

boards save duplicating large numbers of notices

- Organise information boards in prime positions, rather than duplicate multiple copies of notices for everyone. People will read a notice board if it is up-to-date, organised, communicates information clearly and is the only source of information.
- Many charitable organisations collect waste paper for recycling into paper, cardboard, etc. Set up a paper recycling bin in a prominent place and encourage staff and students to use it. Arrange for it to be collected regularly.

8. Other Materials

- Schools consume large quantities of art, craft, science and other materials in their daily operation. Consider how materials could be re-used before they are ultimately discarded as rubbish. (Someone once said that there was no such thing as rubbish—it is just another resource that has not had a good use found for it). Scrap materials from secondary schools can be valuable resources for primary and junior primary schools (particularly art and craft materials).
- Many materials which industry regards as scrap or reject can be obtained free or cheaply. Inquire of local companies for such materials. Recycling co-operatives and collection centres for such materials are available in some education and teacher centres.
- Purchase materials which have a long life and can be re-used, rather than those with a short life or which are intended to be disposable.

MODIFICATIONS TO SCHOOLS

Many school buildings are old and inefficient. They are cold in winter, hot in summer, too stuffy or too draughty. Many are out of scale with young children or inappropriate for current educational practice. Many are wasteful of energy. There is hardly any school which could not be made more pleasant, comfortable, energy-conserving and generally more environmentally sensitive. Schools have large reservoirs of expertise, both intellectual and physical, which can be tapped once people are aware of what can be done and why it might be done. These guidelines aim to increase this awareness of what and how changes can be made. Before planning goes too far, specialist advice may be needed from architects or engineers. The biggest difficulty is often to know when to make use of such outside expertise.

1. Comfort Standards

Accepted 'comfort standards' are usually given to define the desirable limits of temperature and humidity. They can be misleading because there are so many other variables which play a role. People are conditioned to different climates (the people of Cairns have different comfort standards from those in Hobart). Sunshine on a cold winter day can make one feel comfortable despite the actual temperature. A breeze on a hot summer day can do the same. The radiation of heat from materials to people and vice versa can influence comfort significantly. Timber, brick and concrete have a high thermal mass (capacity to absorb heat) and thus have cooler surfaces than metal, plastic and glass which have a low thermal mass. Conduction is also important where the body is in contact with a surface such as chairs.

Comfort is a mix of physical, emotional and intellectual satisfaction. A room with pleasant lighting, colours and materials, and an environment which meets the occupants' needs, has psychological effects which cannot be easily measured but which can be felt.

2. Colour

A simple, effective and economic method of brightening a dull environment is with some paint. Colour can be used to focus on certain areas, to create friendly, familiar, casual, exciting, relaxing or sombre spaces, to give direction and information (graphics), and to identify spaces, services or furniture.

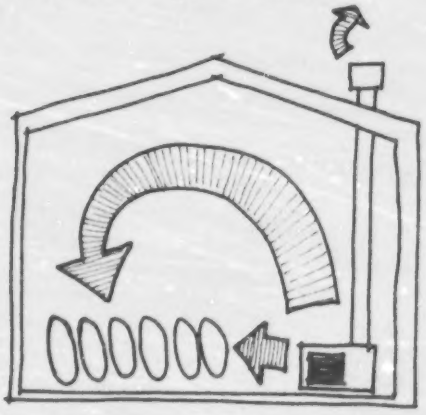
Graphics can be painted on walls as signs and directions, as other information, or as murals and decoration to otherwise plain walls.

Light colours reflect maximum light without being visually overpowering and so are best used on walls and ceilings. Bright or dark colours are best as accents and should be used on floor, pinboards, doors and furniture. In other areas where reflection or concentration of light are not as important, such as corridors, foyers, toilets, offices, entrances, activity halls and outside spaces, bolder, brighter colours and patterns can be used. It is desirable for students to have a part in deciding plants, colours and schemes. People who help to shape their environment are more confortable in it.

3. Heating

There is no simple guide to the most economic or best heating system. It depends on the climate and thus the amount of heating required, the building design, the availability of gas, oil and electricity and their respective tariffs. Specialist advice should be sought as to the most economic way of using or modifying any particular installed system. Oil heating is likely to become progressively more expensive and wasteful of resources than other forms and should be reduced and replaced where possible.

Solid fuel combustion stoves were once very common, and are currently enjoying a revival. They are effective, and economical where appropriate solid fuel such as timber, coke, briquettes is available. The environmental impact of using timber must be considered. Hardwoods burn better than softwoods, produce more heat, and leave less residue in the flue. Scrap timber may be obtained from timber mills or woodwork shops. Such stoves are best suited to small, more remote schools or particular parts of larger schools.

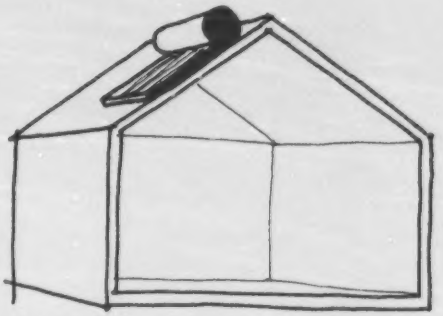


slow combustion stove heats by convection and radiation with a minimum going out the flue

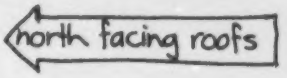
WATER HEATING

Flat plate solar collectors are now a well-established method of providing hot water on the domestic scene in Australia and are capable of supplying the percentages of the total hot water requirements as follows:

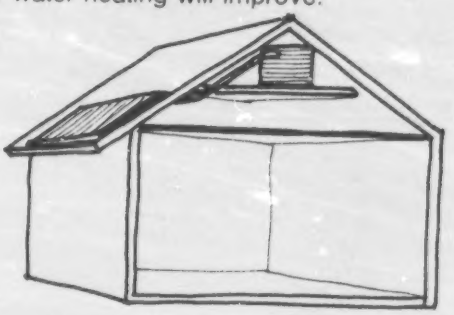
Adelaide	70-75%	Brisbane	75-80%
Darwin	90-100%	Melbourne	65-70%
Perth	75-80%	Sydney	60-70%



integral solar collector and storage tank mounted on the roof



Solar panels should face the north and be inclined at an angle approximately that of the latitude. At present anything above seventy per cent will pay for the extra cost over the life of the equipment. As fuel costs rise, the economics of solar water heating will improve.



solar collector on roof with storage tank in the roof space :(note that the bottom of the tank must be a minimum of 300mm above the top of the collector for the system to operate).

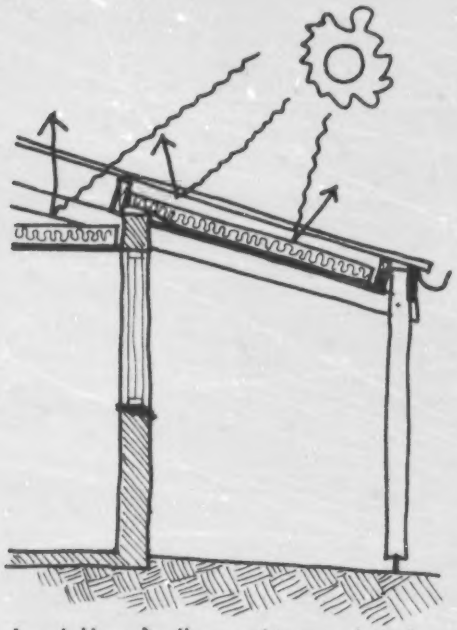
Parts of schools most suited to having solar hot water installations are the domestic arts, change rooms and science laboratories—that is where there is a reasonable and regular hot water usage.

Information on the types of installations and their suitability can be obtained from local manufacturers of solar equipment.

4. Insulation

The cost-effectiveness of thermal insulation is improving as the cost of energy for heating and cooling rises.

The purpose of insulation is to reduce the heat flow through the roof and walls of a building, inwards in summer and outwards in winter. To get the best use out of insulation the building needs to be closed up tight, to eliminate any air leakage. This is quite impractical in summer where it is desirable to have the windows open to utilise any breeze. Thus insulation is most effective in winter. (It is still of value in summer, particularly in the ceiling where it reduces the ceiling temperature and thus the heat radiated down into the room.)



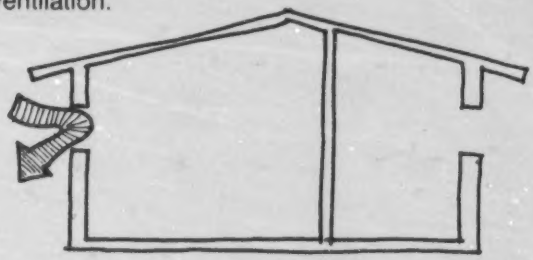
insulation in the ceiling and under verandah roofs

Generally fifty to one hundred millimetres of mineral fibre or fibreglass insulation is desirable in ceilings. Insulating the walls of lightly timbered or metal framed buildings is also desirable. Insulating solid or cavity masonry walls would not normally be cost effective except in very cold situations. Insulation is useful under verandah roofs and eaves overhangs to reduce the heat build-up in these areas in summer.

Advice from architects and engineers should be sought for the optimum amount and location of insulation.

5. Ventilation

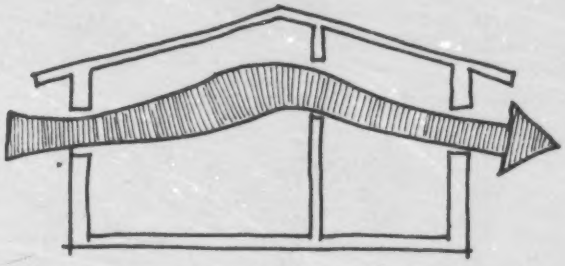
Most old buildings were designed with a large number of opening windows and ventilators in walls and ceilings. They may have become *inoperative* or covered over through neglect. Getting these to work again can improve the ventilation.



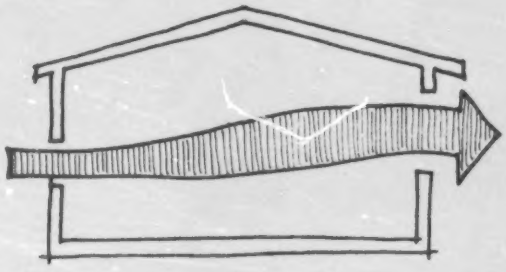
no cross ventilation possible

Cross ventilation is the ideal form of natural ventilation where air can flow through the building. The shape and size of the rooms and the position of inlets and outlets have only a marginal effect as long as some flow can take place across the building. The best cooling effect occurs with an increased air velocity (not a high air volume) with the air directed over the body. To optimise the velocity, outlet openings should be larger than inlet ones. Hot breezes can often be cooled before entering a building by planting shrubs and ground covers immediately outside.

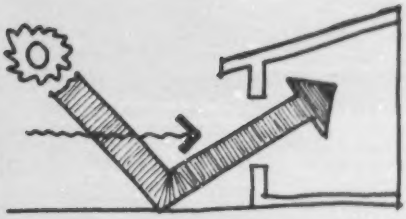
To improve cross ventilation, some fixed panes of glass could be removed and opening sashes or louvres installed.



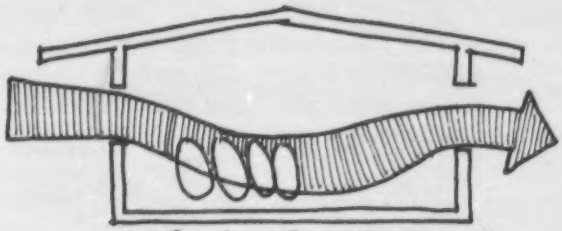
good cross ventilation obtained



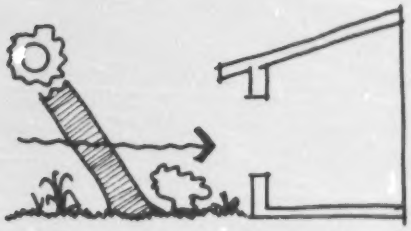
outlets larger than inlets for greatest wind velocity



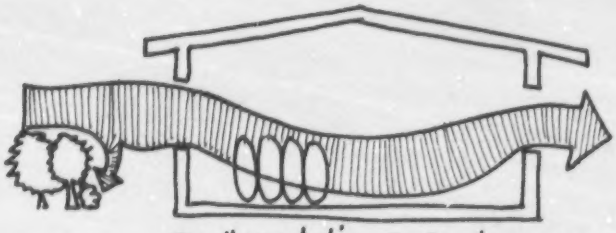
hard paving - heat reflected and wind heated in summer



significant roof overhangs will direct winds down (900mm+ wide)



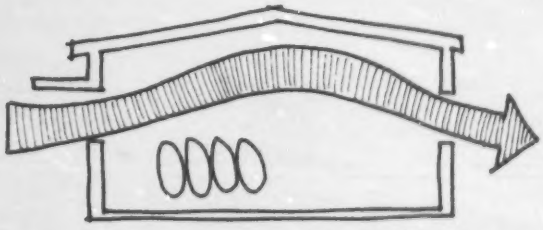
soft paving - heat absorbed and wind cooled in summer



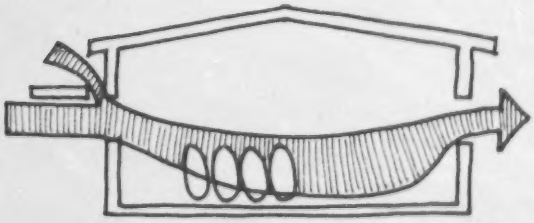
small vegetation 2-4 metres away will also direct winds down.

Some high level parts of internal partitions could be removed (and replaced with louvres if required) to improve internal cross ventilation.

Roof overhangs, and slotted canopies over windows will direct the wind down into the room.



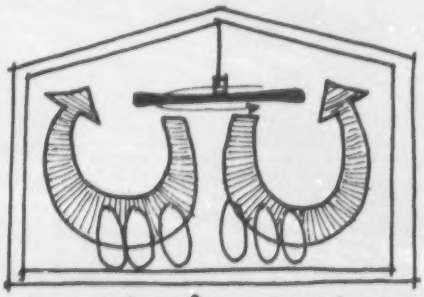
canopy over window will direct wind upwards (desirable in winter)



canopy with a slot however will direct winds downwards

Where summer days are hot and nights cool, having some ventilation during the night can cool the building for the next day. Small adjustable openings (adequately secure) at low and high level are effective. Some awning and hopper windows could be made secure to serve this purpose also.

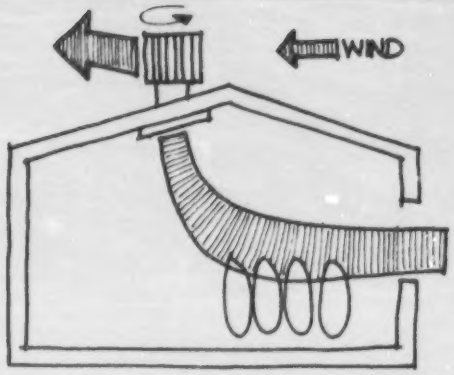
Large, slowly rotating overhead fans are an excellent means of moving air and producing comfort on hot, still days. They are suitable for all climates not just the tropics—they are economical to run and easy to have installed.



slow rotating fans circulate the air in a room effectively

The roof of a building is subject to upward pressures in most instances when the wind is blowing. Wind operated roof ventilators could be installed, preferably at the highest possible point (or over any heat-producing equipment). Motor assisted ventilators are also available. Ceiling openings should be covered in cold weather to prevent warm air from escaping through the roof.

Roof spaces above ceilings should be well ventilated except in very cold climates, to exhaust any hot air built up. Ridge ventilators or



wind driven roof ventilators

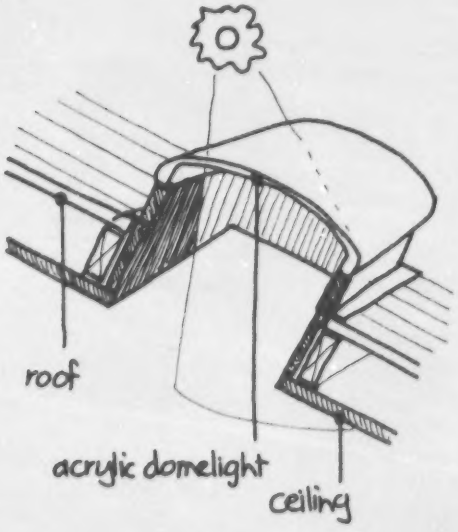
vents in the gable ends can be fitted. However it is important when making modifications to remember that ventilation requirements in winter are much less than in summer.

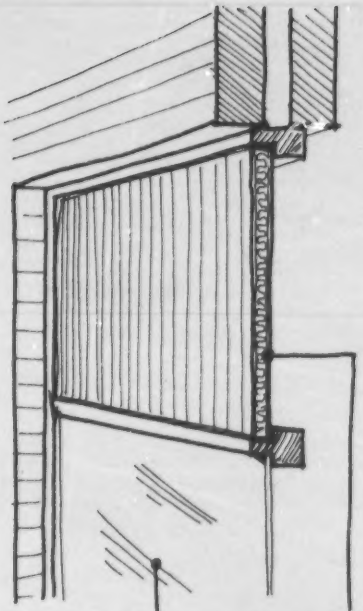
Equipment which produces heat or unpleasant or harmful odours must be well ventilated for comfort and safety, preferably directly to the outside.

6. Windows

Windows are very important, providing views, natural light and ventilation. Many buildings have windows which are either too small, too big or in the wrong places. South and north facing windows give the most even light, additional windows are an expensive item to have installed.

Windows can often be installed more economically in the roof, in the form of skylights (known also as acrylic dome lights). These effectively introduce daylight into interior spaces.



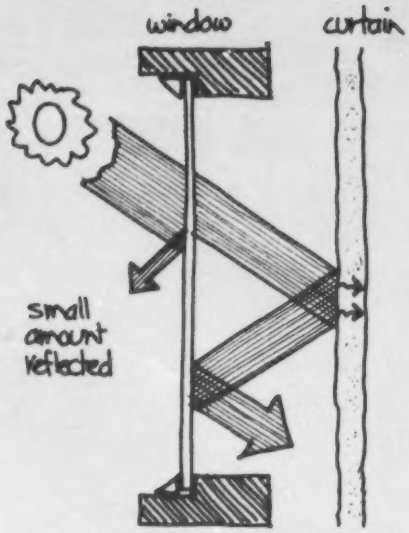


Window area can be reduced by making some glass panes opaque. The glass could be removed and replaced with a solid panel, preferably containing some insulation, and faced inside and outside with an appropriate material (coloured asbestos cement, timber, or metal). Alternatively insulating panels of sisalation, fibreglass mineral fibre, or polystyrene foam can be fixed on the inside of the window leaving the glass intact. Polystyrene foam is flammable and must be used with caution.

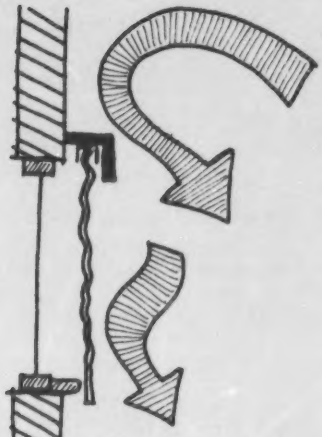
CURTAINS

Glass is a good conductor of heat, thus letting heat in during summer and out in winter.

Curtains can be added to help insulate windows and reduce the passage of heat. Even open-weave curtains can be of value although the heavier the curtain, the better the effect. This is most effective in keeping the heat inside. It is of little effect in keeping the heat outside when the sun is shining directly on the windows. This is because of the 'glasshouse' effect. Heat energy in short wave radiation passes through the glass, is absorbed by the curtain, and re-radiated back towards the glass in long wave radiation which cannot penetrate and is trapped inside. Curtains however can delay the heat from reaching the occupants, and also improve the psychological feelings of comfort. Outside awnings are the only sure way to keep heat from direct sun out of the building.



curtains don't prevent heat from the direct sun on the windows from getting inside



warm air inside is directed away from cold glass in winter by curtains and pelmets

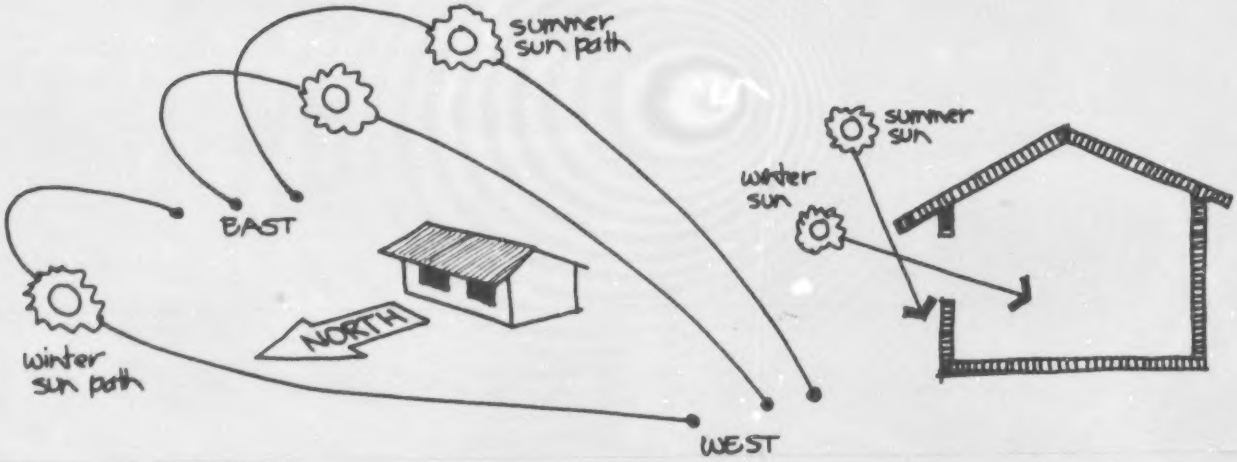
Windows can have pelmets fitted at the top (even when there are no curtains) to reduce the effect of air being chilled as it passes down past the glass on cold days. It would not usually be practical to install curtains throughout a school, but areas which have large windows, or only require a moderate light level, or are exposed to cold winter winds, could have curtains added. This must be balanced against the cost and reduction in natural daylight resulting.

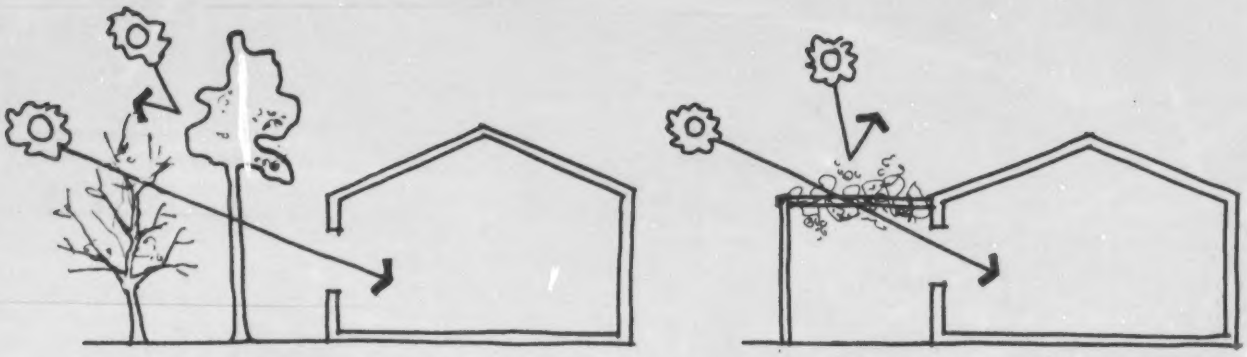
Reflective film, applied to east and west facing windows particularly, can be valuable in reducing glare, but it has little effect on reducing heat flow through the glass.

7. Shade

It is important to know the sun's path during the various seasons, to know exactly when it shines on various walls and in various windows. For example, it rises in the east and sets in the west only for some periods of the year in the southern parts of Australia.

The Department of Housing and Construction publish *Sunshine and Shade in Australia* by R. O. Phillips: Experimental Building Station Bulletin No. 8, which shows how to find the position of the sun at any time of the year, anywhere in Australia, and the effects of shading devices at any time. Thus the type of shading required to protect a north facing window from the direct sun for instance, between 9.00 a.m. and 3.00 p.m., and between October and December, and February and April can be calculated.





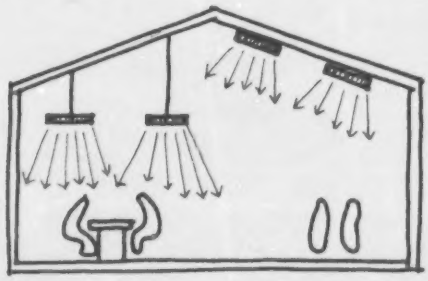
deciduous trees, some eucalypts or vine covered pergolas can shade north facing windows in summer but allow winter sunlight to shine into the building to provide some warmth and make the best use of natural daylight

South facing windows do not require shading. North facing windows should be shaded from summer sun, but allow some warming winter sun to penetrate. East and west facing windows which receive the morning and afternoon sun from a low angle are difficult to control, and almost complete covering of these may be necessary. It would be best if there were no east or west facing windows.

Trees and shrubs on the east and west of buildings can shade these walls (and any windows in them) from the hot summer sun. Tall trees with a high canopy (e.g. many eucalypts) planted close to a building, or deciduous trees (or vines on pergolas) can shade northern walls in summer but let desirable winter sun reach them. Trees can be used to deflect cold winds, cool warm winds, and provide shade. One of the most pleasant places to be on a hot day is in the shade of a tree. Often sunshading can be combined with pergolas, covered walkways and verandahs.

8. Light Fittings

Many light fittings are inefficiently located high up on ceilings. They could be lowered to where they best illuminate the working area rather than the whole space. A height of between 2.4 and 3 metres above the floor would generally be a desirable height for fittings in a normal classroom situation.



efficient placement of lights above the work tops

inefficient light placement high on the ceiling

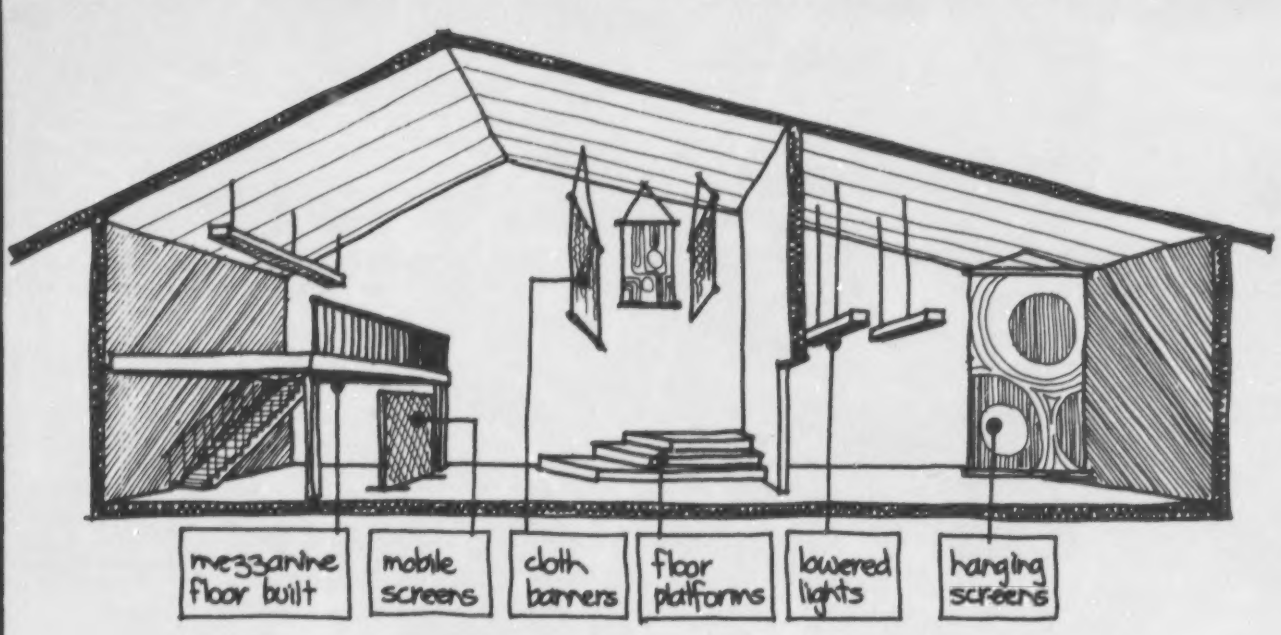
Lighting can be adapted to the particular task requirements. For instance, in staff or student work areas where permanent work stations exist, individual desk lamps or low pelmet lighting give a much better light and are more economical than general overhead room lighting. The best lighting illuminates the direct working area and is just bright enough for the particular task.

individual desk lamps or pelmet lighting give very good illumination efficiently

When daylight is inadequate, darker areas of a room may need artificial illumination. Some rewiring and re-organising of switches may be considered to allow a variety of lighting combinations.

9. Scale

In many schools the scale of the buildings is most suited to large groups of people. A variety in size of spaces, of degree of openness and intimateness, of floor levels and ceiling heights,



is useful for different activities and for small group or individual needs. Sizes of spaces can be varied by using mobile screens, framed partitions or fabric hangings, to divide up large space or enclose intimate corners. Changes in ceilings can be made by building false ceilings, suspending grids of interlocking timber pieces, hanging cloth banners, or lowering light fittings. Changes in floor level can be made by building steps and platforms, either temporary or permanent. Mezzanine floors can be built where ceilings are high enough. Similarly, outside areas can be defined with paving, planting boxes, mounds, steps, screens, seats and planting.

10. Porches

External doors are often exposed to wind and rain, which make it uncomfortable to get in and out, cause heat gain in summer and loss in winter and draught problems.

Porches or screens can be built outside doors to protect them from these problems and also to provide a more gradual transition between inside and outside the buildings.

In more serious locations an air lock could be created by adding an additional set of doors internally, or where this is not possible, an enclosed porch with external doors.

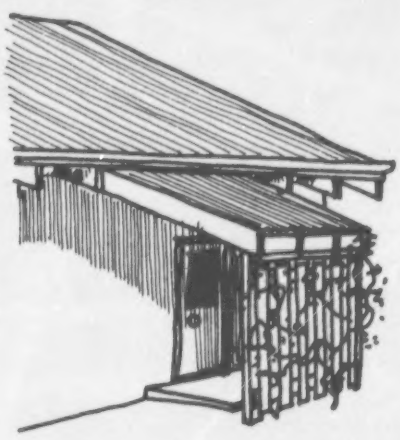
11. Landscape

This is covered in more detail by Smith and Wilson in the article 'Developing School Grounds for Environmental Education' and should be regarded as an integral part of modifications to buildings. Plants can be brought indoors in pots, planter boxes or hanging baskets, bringing some contact with the natural environment inside, freshening the air a little, and adding life and colour to the surroundings.

12. Materials

When making modifications to the school, choose those materials which are durable and require minimum maintenance.

Timber, brick, quarry and mosaic tiles, wool and cotton fabrics, all wear well and often still look good in advanced stages of wear. In contrast, plastics, synthetic fabrics, aluminium and concrete appear very shabby with wear. It has been said that the less molecular change a material undergoes in its processing, the better it wears and the greater the psychological affinity we have towards it.



porch to shelter outside door

SOURCES OF FINANCE, MATERIALS AND EXPERTISE

- *Education Authorities* are the source of finance for most school building work. It is desirable for a school to have an environmental policy for its development, to enable a well documented positive case to be presented.
- *School Councils* are constantly being required to provide finance for a variety of school projects. They can do many things which would otherwise not get done to improve the environment and make the school a more interesting, pleasant and comfortable place. Special fund raising events are a case in point. People are often willing to provide money and labour for specific projects, particularly where these are to improve the school's physical environment.
- *Community Groups* are using schools more often and many organisations are prepared to put finance and labour into facilities in return for the use of them.
- *Local Government* also can be a source of funds and equipment where sharing of facilities with the community is envisaged—as can other government departments.
- *Schools Commission* can sometimes provide information, advice and innovations grants.
- *Local Industry and Business* may be prepared to donate finance, materials or equipment for specific projects or features within a school, particularly where the wider public can observe the gesture. The local rubbish tip can be a surprisingly useful source of materials as well as the recycling centres.
- *Sources of Expertise*—Public Works authorities' architects and engineers, tertiary institutions' schools of architecture and engineering, the CSIRO, the Department of Housing and Construction's Experimental Building Station can be sources of expertise in matters relating to buildings and their surroundings.

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Graphics

Rogouin, M., *The mural manual (how to paint murals for the classroom, community centre and street corner)*, Beacon Press, 1973. Basic instruction, inspiration and details for painting.

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DEVELOPING SCHOOLGROUNDS FOR ENVIRONMENTAL EDUCATION

J. H. Smith
J. R. Wilson

PREAMBLE

Environmental education requires children to go out of doors. Schoolgrounds are the nearest and cheapest outdoors for classes to visit and yet they are often overlooked. The authors of this article hold the view that the careful development of the schoolgrounds creates a rich and valuable resource—the school's own environmental study area—and, for those teachers interested in developing their schoolgrounds for environmental education, they outline the major planning steps as well as the major features which have to be considered if the schoolgrounds are to be developed in ways that reflect the wishes of the total school community.

INTRODUCTION

> The child needs to learn what lives in the water, what lives in the air, what lives on the earth, and how human beings are related to these growing, living, singing, fighting and playing creatures. Any environment is crippling if it cuts the child off from such experiences (Mead,1972, p. 249).

Children are stimulated by the outside world by the living things, the buildings and the people that surround them. This inherent interest should be seized on by getting children out of the classroom and into the outdoors. Children learn best by doing but theoretical study in the classroom is their major learning experience. Too often their education is sucked dry of 'real' experience. The nearest outdoors to the classroom are the schoolgrounds. They are easily accessible, there is no cost involved in getting there, and yet they are usually poorly developed from an educational point of view. As they are part of the school they can be developed by the school for its own special use.

Schoolgrounds can serve a variety of purposes, including:

- the children's recreational needs
- the teacher's educational use
- an example to the community of the values of aesthetics and conservation of the environment.

Well designed and developed schoolgrounds can serve all these purposes. For example, plants needed for study purposes can also be selected to enhance an otherwise harsh, drab building. Plants can provide colour and shade, a variety of shapes, and a range of levels to relieve flat expanses. Dense planting of bushy species can reduce wind velocity and outside noise which may help in lowering distractions and discomfort.

This document outlines the broad steps needed to realise the potential of a school's grounds. Specific information on such things as helpful organisations, suitable plants, resource personnel, and available funds is not given as these vary from school to school.

WHERE TO START

If you feel that something needs to be done about your schoolground, and you are willing to do it, then start by finding out who else on the

staff is interested and willing. It may be best to form yourselves into a working party, 'The Grounds Committee', and so tackle the problem formally. The purpose of this committee would be to gather information and ideas on the development of the schoolgrounds, organise these and present them as a range of possible options. To ensure that ideas and options are representative of the school body, membership of the Grounds Committee could include an elected or nominated body representing students, staff, parents and the general community. Another alternative may be to call in an adviser or consultant from outside the school who has expertise in the development of schoolgrounds. Such a person can stimulate interest, help overcome problems caused by vested interests, and give a fresh approach to the scheme.

Once established, the committee should gather all relevant information on the whole school site. Various classes in the school could be asked to help. Past school plans which show the entire site, buildings and major service lines of water, gas, sewer, telephone and power are an essential information source. Site plans which show the contours of the grounds should also be obtained. A comparison of present and future plans should indicate the school's trend of development. Future plans should be checked through the relevant Departmental agency. Details should also be gathered on the site's soil type. It is easily eroded, suitable for tree planting, easy to work? Information on the local vegetation will help in the selection of suitable species for future planting. Old residents in the area can be most helpful on this topic. Data on rainfall, temperatures and prevailing winds are important for determining the location of activity areas as well as selection of suitable plants.

The working party should also look at how the site is used. What is the student traffic flow? What are the main play patterns? Are the grounds used by the community for weekend sports?

It is also important to assess problems faced by the school at present and those anticipated in the future. Common problems may be those relating to size of grounds, vandalism, lack of use, apathy, staff turnover and maintenance of grounds during vacations.

Possible sources of assistance should be investigated—for example, the school itself, parents, local councils, community groups, the education authority, government departments, and local industries. Steps can be taken to start local fund raising activities. Some organisations provide funds as a matching grant, dollar for dollar. Try to discover parents who can help offset costs such as nurserymen, earthmoving equipment operators, bricklayers, truckdrivers, landscapers or parents prepared to work on the site. Many may just wish to contribute to fund raising activities and these can commence immediately.

The major task in all the preliminary planning is the collection of ideas for the development of the schoolgrounds. Children should be contacted first for the success of any developments will be determined by them. They will always be the major users.

IDEAS TO CONSIDER

The following ideas are those which could be used to develop schoolgrounds for environmental education. They relate specifically to playscapes, parks, plants, animals, water, and outdoor classrooms. Other aspects, particularly those catering for active recreation and movement of people, will also need to be considered when planning. As information on their needs is readily available, it is not included here.

Playscapes

Play is a voluntary, spontaneous activity carried out as an end in itself. Nevertheless the products of play—the development of physical skills, social skills, imagination, understanding, the senses—are important outcomes to the educators. Play can be used by the environmental educator to develop an awareness of different sounds, smells, colours and textures, to help discriminate between similar elements of the environment and to encourage a love of the outdoors. However, this will require a radically different approach to playgrounds as we know them, perhaps development along the lines of the adventure playgrounds of Europe:

> An adventure playground is a place where children of all ages, under friendly supervision, are free to do many things they can no longer easily do in our crowded urban society: things like building—huts, walls, forts, dens, tree-houses;. . . tree-climbing, digging, camping; perhaps gardening and keeping animals; as well as playing team and group games, painting, dressing up, modelling, reading—or doing nothing. For it must also be a place where children just meet and talk in a free, relaxed atmosphere. They do not have to pay to enter, nor do they join as members. They just come to the playground whenever they feel like it (Children's Environments Advisory Service, n.d.).

Watch how the children in your schoolyard play and note how they use elements that are fixed, rigid, flexible, movable, simple or complex. If that sets you thinking in terms of

In their play, children use elements that are fixed, rigid, flexibile, movable, simple, or complex.

pieces of equipment for play then go back a step and think in terms of unstructured elements such as planks, pipes, logs, tyres, tubes, hessian, bags, ropes, cables and the like. Now go back another step and think in terms of natural elements like hills, trees, bushes, animals, water, soil, sand, rocks, wind and sun. If you are going to provide more than the natural elements on the sites (and that is usually necessary because of the flat openness of most school sites) then it is important to try and anticipate the many ways children might use what is provided. Just watch how an uninhibited group use a slippery dip and you'll get the idea!

Safety and supervision, shelter from sun, wind and rain, pathways for movement, sensory appeal of colour, shape, texture, smell, sounds, storage, drainage, and maintenance, not to mention cost, must be taken into account as well as the need for the delineation of active, quiet, individual and group play areas. Planning is important.

Playgrounds are living things and so the dividing line between construction and maintenance must remain a subtle one.

Parks

The wide open spaces of lawn and bitumen, common in most schoolgrounds, are not usually conducive to privacy, contemplation, communion with nature, or stimulating the imagination for drama, English, film making or art. A park-like area of variable light, shade, and texture can provide a background for formal studies as well as for an individual's personal development. Trees can be planted that are important to Australian history, to local folk lore, in woodworking and in science and geography courses. Others can be provided to encourage animals that in turn enrich the study potential of the schoolgrounds. A useable area that is also a place of beauty may attract other members of the community to walk, sit or picnic in it—and that could have advantages in discouraging vandalism in the school.

Plants

Trees are important in playscapes for climbing, swinging, balancing and jumping, but can also be used to modify the climate in different areas of the grounds. As a windbreak they need the help of smaller bushes to prevent eddies and broken tree limbs in high winds. As a sun filter they can be used to catch the high summer sun but let the low winter sun through. Trees also catch dust, noise and water, produce oxygen, alter the humidity, and prevent erosion. They also create visual effects by defining areas, providing backdrops, hiding views and entertaining children who look out of windows.

Shrubs and Bushes: How many different smells can you remember? Aromatic shrubs and herbs can be spread throughout the grounds, collected in a special scent garden, or used as pot plants in foyers and on window sills.

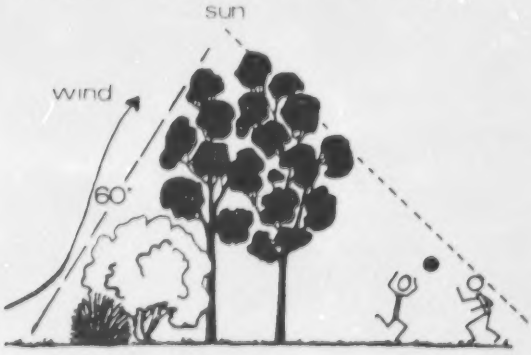
A park-like area of variable light, shade and texture can provide a background for formal studies as well as for an individual's personal enjoyment and development.

Plants create visual effects by defining areas, providing backdrops, hiding views, and entertaining children who look out of windows.

How many green colours can you differentiate between? Do native plants flower throughout the year? What do pollen-eating birds do when there are no flowering plants about? What colour flowers attract moths in the night or butterflies in the daytime? A careful selection of shrubs and bushes can stimulate children to ask such questions—and provide answers for the observant ones.

Smaller Plants: Food plants grown in vegetable plots give children a chance to experience the seasons and the complexities of the soil, as well as rewarding them for their skills. Gardening can be done in conjunction with a compost heap that takes the lawn clippings and canteen and lunch scraps and turns them into plant nutrients. Plants needed for social studies, geography and science lessons such as rice, wheat, maize, peas, geraniums, mosses, ferns, liverwort or algae can be grown in special laboratory gardens in special areas of the school ground, depending on the climatic control needed for successful growth.

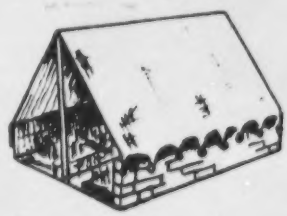
Trees act as a windbreak and a filter for sunlight.



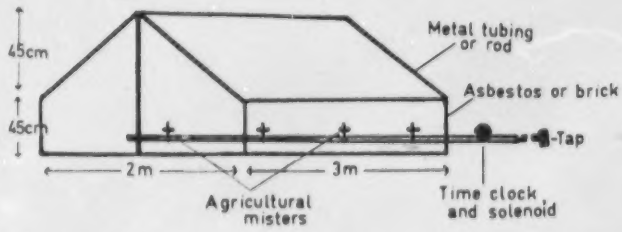
Gardening provides tangible rewards to children for their efforts.

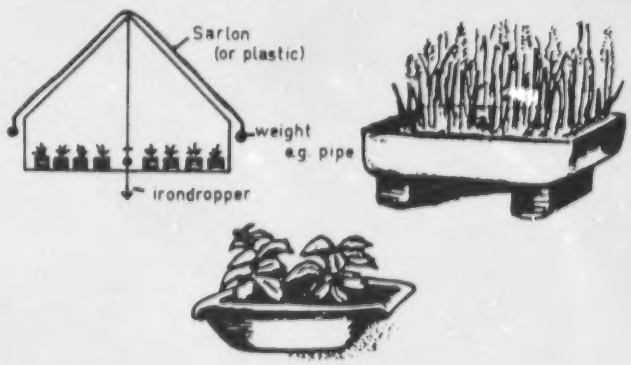
Shadehouses and Glasses: These can be made cheaply and are very useful in controlling temperature and humidity for the germination of seedlings, the striking of cuttings, and the growing of special delicate plants. These are best located in suitable courtyards between the school buildings.

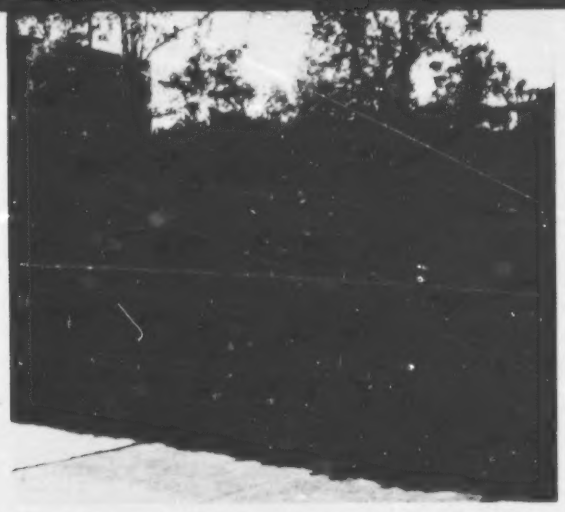
Shadehouses, glasshouses and propagating frames can be made easily and cheaply.



PROPAGATING FRAME







Ground cover plants keep temperatures down, stabilise moisture content, suppress weeds, prevent erosion, all colour, attract insects, and provide a habitat for lizards.

Some schools are fortunate enough to still have pockets of the 'original' communities of their districts.

Groundcover: Plants in schools are often limited to grasses, even where a durable playing surface is not essential. This can be costly in water and time for maintenance. Over two hundred species of groundcover are available. These help keep ground temperatures down, while they stabilise moisture content, suppress weeds, prevent erosion, add colour, attract insects, provide a habitat of lizards and so on.

Animals

There are many valuable educational experiences to be gained by the keeping of animals at school. These experiences can provide children with opportunities to observe animals close at hand, to understand their needs and behaviour, to observe birth, life and death, and to develop feelings towards them. A result of this may be to encourage children to realise the needs of animals in the wild for a suitable habitat and that once this is destroyed the animal may disappear with it.

Provision of suitable habitats enrich the variety of wildlife in the school grounds.

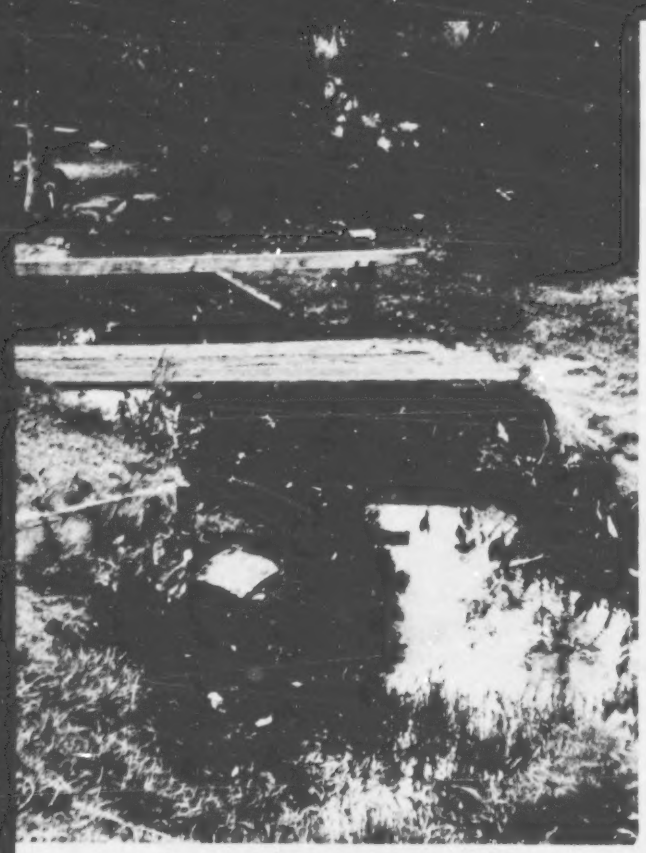
Animals kept in the schoolgrounds—and that can include sheep, goats, chickens, frogs, lizards, tortoises, mice, and so on—require maintenance. If this is recognised and suitable arrangements can be made to ensure their well-being, especially over weekends and holidays, then the keeping of pets in schools can be a valuable activity.

There is, however, another way of keeping animals, even ones such as possums, sugar gliders, hopping mice, magpies, parrots, willy-wagtails, honey-eaters, lizards, tortoises, frogs and insects, and that is to provide suitable habitats, sufficient food sources and protection.

Communities: The stability of a natural community usually increases with the degree of complexity it contains. The interactions between living organisms, as well as the life-style of individual organisms, can form the basis of short and long term studies in both primary and secondary schools. Not only can communities be used to study such things as ecology, animal behaviour, classification, they can also be a source of inspiration in art, dance, drama and language development.

Water

Runoff from roof and surface water of schools can be dammed and the dam used for the study of water life, for aquaculture (fish, yabbies), as a haven for water birds, or a setting for the simulation of water erosion at beaches and along creeks. Ponds can be used as reflecting pools to invite meditation, to protect special features, to enhance sculptures and to float things in. There is another possibility for surface water on a school site. Once water is stored, the wind can be used to pump it up over special



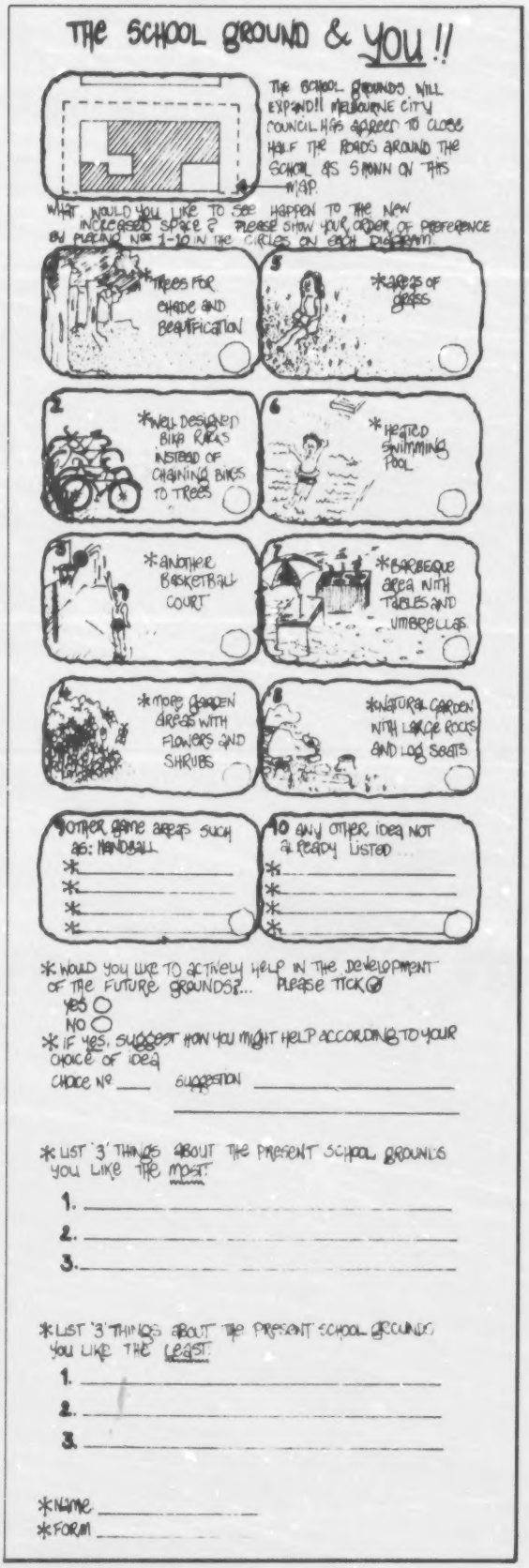
Ponds provide an extra dimension for study.

walls and windows, over musical sculptures and back to the storage point. The movement of water only when the wind is blowing can reinforce the rhythms of the day and season.

Outdoor Classroom

Courtyards, amphitheatres, and observatories for astronomy or weather are other features that can be considered in the development of schoolgrounds. Although each may have its special function and hence requirements, multipurpose usage is desirable and should be planned for. The following description by A. Grossard of the development of an ecology centre at Kew High School, Victoria, is indicative of the possibilities:

'Many schoolgrounds contain areas which are not used, either because they are remote, noisy, or just unattractive. Such unproductive areas can be turned into valuable teaching and recreational facilities useful both to students, staff and community, appealing and aesthetically pleasing at the same time. In an inner suburban area in Victoria at Kew High School, where most of the school area is taken up with asphalt and buildings, an unused part of the grounds has been rejuvenated and developed into an Ecology Centre.


THE SCHOOL GROUND & YOU !!
THE SCHOOL GROUNDS WILL EXPAND!! MELBOURNE CITY COUNCIL HAS AGREED TO CLOSE HALF THE ROADS AROUND THE SCHOOL AS SHOWN ON THIS MAP.
WHAT WOULD YOU LIKE TO SEE HAPPEN TO THE NEW INCREASED SPACE? PLEASE SHOW YOUR ORDER OF PREFERENCE BY PLACING Nos 1-10 IN THE CIRCLES ON EACH DIAGRAM
1 *TREES FOR SHADE AND BEAUTIFICATION
5 *AREAS OF GRASS
2 *WELL DESIGNED BIKE RACKS INSTEAD OF CHAINING BIKES TO TREES
6 *HEATED SWIMMING POOL
3 *ANOTHER BASKETBALL COURT
7 *BARBEQUE AREA WITH TABLES AND UMBRELLAS
4 *MORE GARDEN AREAS WITH FLOWERS AND SHRUBS
8 *NATURAL GARDEN WITH LARGE ROCKS AND LOG SEATS
9 OTHER GAME AREAS SUCH AS: HANDBALL
10 ANY OTHER IDEA NOT ALREADY LISTED
* WOULD YOU LIKE TO ACTIVELY HELP IN THE DEVELOPMENT OF THE FUTURE GROUNDS?... PLEASE TICK
YES
NO
* IF YES, SUGGEST HOW YOU MIGHT HELP ACCORDING TO YOUR CHOICE OF IDEA
CHOICE No ___ SUGGESTION ___
* LIST '3' THINGS ABOUT THE PRESENT SCHOOL GROUNDS YOU LIKE THE MOST:
1.
2.
3.
* LIST '3' THINGS ABOUT THE PRESENT SCHOOL GROUNDS YOU LIKE THE LEAST
1.
2.
3.
* NAME
* FORM

'The Centre was designed as a means of promoting scientific study and research in true-to-life natural surroundings, where students actually observe inter-relationships between plants and animals, perform microscopic work and carry out research projects, sometimes over a year's duration.

'Three different ponds were created to provide opportunity to study ecology over four seasons. A deep freshwater pond breeds various fish and other small animals and grows deep rooted plants. A shallower freshwater pond is used mainly for the growth of invertebrates, plankton and small plants, while in contrast to these two, a third pond has been established as a marsh area.

'One obvious result has been considerable saving in travel costs for excursions and purchasing biological materials. But more satisfying still is the versatility and usefulness of the Centre as demonstrated by the ways in which it is used by each faculty.

'The drama class uses it to perform one act plays adapted around the natural setting, geography students work on contours, erosion and land development, art uses the Centre for drawing and sculpturing, and English for promoting discussion groups. The woodwork classes use the Centre as a means of teaching techniques involved in mass production and students manufacture name plates for trees, inscribing both botanical and common names and the name of the donor.

'Students manufacture name plates for trees, inscribing both botanical and common names'.

'Finance for the Centre came from the School Council, fundraising, donations and a Schools Commission grant. Ideas were gleaned from teachers, students, and community people interested in landscaping. Detailed plans were costed and assessed, and the work carried out in stages. Two weeks of subcontracting saw the heavy manual work involving ponds, bridges, seats, completed, and students performed the rest. In three weeks Year 7 to 12 students had moulded hills and gullies, removed weeds and rubbish, applied mulch, and sown grass. Ground-covers were used to reduce weeding and maintenance. People who donated trees, planted and staked their own.

'Because the Ecology Centre is used continuously throughout the year supervision became essential. This is undertaken by senior students. The lack of vandalism, growing respect for the fauna and flora and the students' obvious appreciation of their Ecology Centre was gratifying. Indeed the transformation of this once unused, unproductive area into such a Centre which is both appealing and widely used educationally, is proving a very worthwhile experiment indeed and an indication of what may be done in other schools.'

OTHER CONSIDERATIONS

There are a number of other considerations besides formal education and costs, that ought to be taken into account when planning your schoolgrounds.

Visual Considerations

A school landscape can be exciting if care is taken to provide a rich blend of visual stimuli. These can take many forms, from paths whose ends are hidden from view, to specimen trees whose size is highlighted by their isolation. In addition to the overall character of the landscape in which the school is situated, it is important that a balance in scale, shape and colour is achieved between the elements on the site. This means for instance that plants should be selected with habit, leaf, flower and trunk colour, position in relation to buildings and other plants, all carefully in mind.

Colours such as reds and yellows are warm, close-up colours, whereas blues and purples are cold receding colours. Such effects can be used to enlarge or reduce apparent space. As one moves through the landscape, filtered views, constantly changing vistas, and surprise elements can all add excitement to it. These are the techniques of the landscape architect and landscape gardener.

Attracting Life

Insects will be attracted to most plants in the school. However, if you want to attract special insects you will need to know their food plants. For instance, Wanderer and Monarch butterflies lay their eggs on the introduced milkweed *(Asclepias sp.)*. Butterflies are attracted to small, tubular, blue and purple flowers, night moths to white, tubular flowers and bees to cup-shaped flowers.

Birds can be attracted by providing food, shelter and water, but each has its own special requirements and some are more tolerant of humans and noise than others. Small bush birds require a relatively small area for their feeding, nesting and social activities and may take up residence in the quieter areas of the schoolground. Larger birds may use it for occasional visits or use it regularly as they migrate across the country. Some larger birds such as owls, magpies, kookaburras and the introduced blackbirds may eat or drive away smaller birds. To increase the range of birds visiting the schoolgrounds, try and provide the following:

- tall gum trees for birds such as lorikeets that prefer to remain in the tree tops
- gum trees with lots of foliage and blossom to encourage insects and foraging birds such as honeyeaters
- dead trees or hollow logs for nesting sites
- a variable understorey with dense sections to encourage small bush birds such as wrens, chats, thornbills, and open sections with natural grasses to encourage finches and parrots
- a range of nectar producing plants to ensure flowers the year round
- water, particularly running water, with nearby shrubs and trees to act as perches

Mammals such as possums, bats, and even bandicoots might move into the grounds from nearby bushland areas when foraging at night. Possums can be encouraged with apples, sultanas and dry bread, and bandicoots will take fruit, sultanas and meat scraps. Bats are mostly insectivorous, catching night-flying moths and beetles. It may be necessary to add the animals of your choice when the habitat is judged suitable, e.g. Kangaroo hopping mice *(Notomys sp.)* would require an open, warm, sandy area with several rocks and logs and lots of seed-producing plants, with some access to water.

Reptiles, such as lizards, usually require north-facing rocks on which to sunbathe, and rocks, logs, plants or burrows to hide among. They are mostly omnivorous and eat insects, snails, and plant matter, especially fruit. They usually need water and so their habitat may need to be located near a pond.

Frogs can be attracted over surprising distances by the provision of a semi-permanent pond and a moist habitat around it. They eat insects and their tadpoles eat algae which can be readily grown in the pond.

Further information on the special requirements of the animals of your area should be available. Ask a biology teacher.

Maintenance

The time cost of maintaining any new features in the grounds should be considered at the outset, particularly for those that will be used intensively and may become unsafe or unfunctional. This is not always easy to estimate and where it involves plants it will probably require the experience of a gardener. The function of the element must be clearly established so that maintenance is directed towards that function. Raking of leaves, constant watering and trimming in an area of native plants may be both unnecessary and inappropriate if the function of the area is to provide for the study of the life it attracts. Patience and acceptance of a natural order (chaos to some) may not come readily to those who are accustomed to controlling the growth of their plants.

The maintenance of the garden can have a greater effect than the initial plan. For this reason a detailed maintenance schedule is important. It can also be a useful reminder of the project aims for new personnel who may come onto the scene.

Maintenance of plants can be minimised by:

- selecting plants appropriate to your soil and climate, bearing in mind the micro habitats created by buildings and other plants
- site preparation: most plants grow best without competition from weeds. Initial deep cultivation and the use of fertilisers will encourage rapid growth of many species
- protection: from wind by thick plantings or a brush shelter (plants can become too dependent on stakes and not develop a strong root system although there is much debate on staking) protection from desiccation by use of a thick mulch of leaves, wood shavings, loose soil, gravel, plastic, paper (care) and even bitumen

- watering as infrequently as possible (careful selection of species and time of planting can mean no watering is needed especially after the first summer. Drip irrigation should be considered for those species needing watering for several years. The hotter and windier the weather the more the plant will need water. The amount retained in the soil will depend on drainage, soil type and groundcover. It is sometimes useful to plant a soft-leaved plant which wilts under dry conditions among hard-leaved native plants which give little indication of when they need water)
- planning for plants with similar water requirements to be grouped together *(a common problem with native plants is over-watering)*
- weeding: weeds are unwanted plants and so should be removed. Rather than pulling them out by hand, it may be easier to starve them of water and sunlight by planting taller plants among them, or by planting ground-cover around the edges and encouraging it to grow inwards over the weeds. Heavy mulches, plastic, old carpets and linos can also be used to keep down the weeds to give other plants time to grow
- encouraging a diverse community of plants and animals. This will help the area to a stable, climax community. However, in the early stages as it moves from a very simple community some species, particularly insects, may threaten certain species of plants. If you can, wait until you are absolutely sure no birds, spiders, or other insects are going to control the 'pest' and then remove it by hand (schools are never short of hands). If this is impractical, spray with *water* or cut off the infected section. As a last resort chemicals such as Derris Dust can be used for chewing insects and white oil or 'Meta-Systox' can be painted directly onto the bark for sucking insects. The secondary effects of such chemicals could form the basis of discussion in class.

DECISION-MAKING

Once the working party has considered all ideas and suggestions, it faces the task of communicating them to the entire school community, giving adequate time for discussion, and then starting the difficult task of deciding which ideas, and whose ideas, should be given priority. The aim should be to come up with plans that are suitable to all those involved. This of course may be quite difficult for wishes may conflict. For instance, students may desire creative play areas that are untidy in appearance, while the principal wants the grounds to be neat and orderly. The points not to be forgotten are that the grounds should be an educational resource usable by the whole school and that, therefore, the whole school community should be involved in making decisions about them. The broad stages required to make a decision are summarised in Figure 32 and are discussed in sequence below.

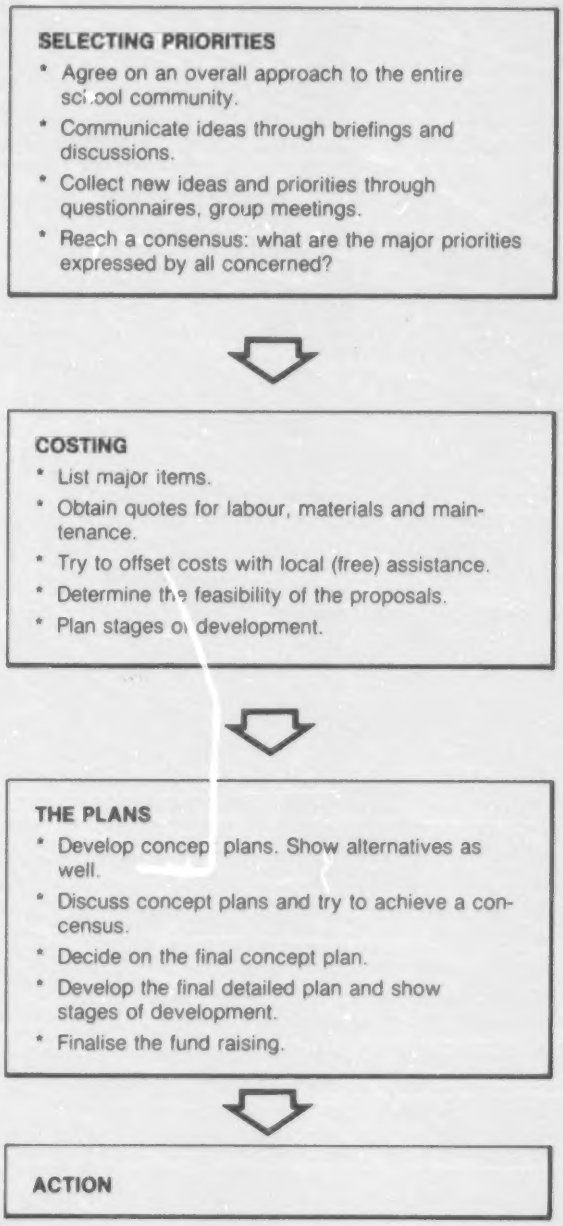

SELECTING PRIORITIES
* Agree on an overall approach to the entire school community.
* Communicate ideas through briefings and discussions.
* Collect new ideas and priorities through questionnaires, group meetings.
* Reach a consensus: what are the major priorities expressed by all concerned?
COSTING
* List major items.
* Obtain quotes for labour, materials and maintenance.
* Try to offset costs with local (free) assistance.
* Determine the feasibility of the proposals.
* Plan stages of development.
THE PLANS
* Develop concep plans. Show alternatives as well.
* Discuss concept plans and try to achieve a concensus.
* Decide on the final concept plan.
* Develop the final detailed plan and show stages of development.
* Finalise the fund raising.
ACTION

Fig. 6.4 *Implementing Proposals for the Development of School grounds*

Selecting Priorities

The working party should consult students, teachers, school administrators, parents, school council, the local community and Education Department personnel to ascertain their feelings, as accurately as possible, and to identify the most popular ideas. Briefings may be held to explain the project and outline the range of ideas so far available. The aim of this is to broaden everyone's horizon. Briefings can be followed by discussion to bring out further ideas and any anticipated problems, and to indicate areas of agreement. New ideas, whether from students or from staff, should be evaluated by the groups involved before being passed back to the working party. Questionnaires (see Figure 33 for an example) may be used to set out the alternatives, heighten awareness of the project, and ultimately begin to sort out the most popular items. Contradictory, or opposing, proposals may be set out and so force opinions to galvanise.

Using a consensus approach, the working party will need to sort out those items given a high priority by the discussion groups, in questionnaires, and in ideas from other sources. A list should be made of these. Less popular items should not be excluded automatically: they may fill important gaps in the overall plan. The working party should by now be in a position to determine the feasibility of selected items over a specified time horizon.

Costing

Once the working party has identified the major priority items that the school has determined, and that should include more than the number likely to be included in the final plan, they should obtain quotes to cover cost of labour and materials, maintenance, as well as the estimated time for completion from local contractors. Some costs may be offset by using expertise available and volunteered from within the school community.

The results of the overall costing exercise—quotes from contractors, costs of landscaping materials and plants, and so on—will soon make clear those items that are feasible within the school's financial situation. The costing exercise may also indicate the need for a number of development stages over several years if all the desired proposals are to be implemented.

The Plans

Having thus established the most popular items, the costs involved, the priorities and thus the feasibility, it is now that the concept plans should be drawn by someone with mapping or drawing ability. It is preferable to provide one or two alternative plans. The concept plans should include the main ideas or desired features in sufficient outline for them to be meaningful. Agreement must now be reached between the ultimate users of the schoolgrounds and all groups mentioned earlier should be again consulted, and be seen to be consulted. Eventually, through discussion and compromise, or through voting, a final decision must be arrived at. An outsider on the working party can play a vital role in helping the groups reach a consensus.

Once consensus is achieved, a detailed plan can be drawn and presented for display. The plan should show the main features of development and their stages over a given time. The detailed plan can be produced for stage 1 only, but it is preferable to prepare a plan for the entire grounds. This avoids the likelihood of haphazard development. It is especially important that file copies be kept in case of future staff turnover. Upon completion of the detailed plans, the school is in a position to commence work. Fund raising activities, which were run in conjunction with the earlier work, should be at an advanced stage.

The Action

A timetable for activities should be drawn up by the Grounds Committee. Parents, local citizens or community groups willing to assist should be contacted. Where they are to be employed, contractors should be notified as to when they will be needed. A basic timetable would show the following:

- Assembling materials/equipment
- Site preparation
- Landscaping
- Planting
- Mulching
- Clean Up
- Maintenance

This timetable should consider the most appropriate working activities in accordance with the most appropriate season. Planting should take place in autumn or spring in most places, thus the preceding activities should have been concluded beforehand.

Students can be involved in all of these stages during regular school days and on weekends in activities such as digging, landscaping, constructing and planting. This not only increases

their commitment to the success of the project but may help avoid vandalism later on.

If parents and community groups are to be involved, then working bees will need to be organised. These need to be well organised. People need to be given careful instructions as to their activities for the day. One person should have the responsibility to oversee the project, make on the spot decisions and ensure quality of work. Volunteer workers must accept this person's authority for the construction to proceed smoothly. A phased program should allow the completion of each stage in reasonably quick time. Thus the working bee will see success for its labours and the whole school can begin to see the effects of the project. This may encourage others to become involved. Often working bees can be concluded with a barbeque or picnic and so take on a more relaxed and social atmosphere. Insurance cover will be needed for all 'workers'.

If a contractor is to be employed, then the site should be fully prepared. Often they are employed on an hour, half-day, or day rate. Thus if they can commence immediately, considerable funds can be saved. Working bees can prepare for their arrival or clean up after they have gone.

In all, the action should be timetabled and directed by the Grounds Committee. All work should be in accordance with the detailed plans and the project will gain added stimulus if stages are seen to be completed. A ceremony at the completion of each stage can help.

CONCLUSION

The involvement of students throughout such a project will not only increase their awareness and knowledge of the local environment but will develop their skills in collecting, organising and presenting data. Decision-making and advocacy skills, as well as skills in effecting policy and practice, will be learned through active participation in the project. Attitudes to the local environment as well as towards social structures will be developed. Such benefits need not of course be confined to the students. In fact, the *process* of providing better schoolground facilities for the intellectual, social and emotional education of children can have significant educational value to the students, teachers and parents who become involved in it.

FOR FURTHER HELP

Australian Plant Study, *Grow What Where*, (a quick guide to plants with special uses, available from the Group, 1 Balacombe Crt, Croydon, Vic. 3136.)

Children's Environments Advisory Service. *What is an Adventure Playground?*

Gengtsson, A., The Child's Right to Play, International Playground Association, 1974.

Dattner, R., *Design for Play*, MIT Press 1974. (Useful background to the philosophy, sociology and psychology of designing playgrounds in urban U.S.A.).

Lady Allen of Hurtwood. *Planning for Play*, Thames and Hudson, 1968.

Lothian, N., *Commensense Gardening*, Pollard, 1976.

Moloney. *Designing Australian Bush Gardens*, Horwitz, 1967.

McKinlay, B., *Growing Things:* Nature Study Ideas for the Primary School, Primary Education Pty Ltd, Vic, 1979.

Bell, G. & Tyrwhitt, J., *Human Identity in the Urban Environment*, Pelican, 1972.

Mules, B., *Keeping Reptiles and Amphibians*, Education Department, S.A., 1975.

Newmann, F. M., *Education of Citizen Action:* Challenge for Secondary Curriculum, McCutchen, 1975.

'POD', *Primer for Playground Planning, POD on Cubbies, POD on Ropes, POD on Tyres, Go Jump*—film on setting up a playground in a park. Available from Playgrounds on Demand (POD), 32 The Boulevard, Floreat, W.A. 6014.

Readers Digest, *Landscape Gardening*. Practical Guide to Home Landscaping, 1976.

Rogers, F., *Growing Australian Native Plants*, Nelson, 1971; *Growing More Australian Native Plants*, Nelson, 1975.

Ross, *et. al., A Study Guide for Native Australian Plants*, McDonald Park Primary School, Mount Gambier, S.A., 1977. (Activities and background information).

Salter, B., *Australian Native Gardens and Birds*, Ure Smith, 1977.

Society for Growing Australian Plants can be helpful in selecting plants for special functions.

Victorian Playground and Recreation Association, 37 Gertrude Street, Fitzroy, Vic. 3056, sells a large range of books and will help with design, materials lists, plans, displays and supervision of construction. Pamphlets on designing a playground, mound making and maintenance considerations for plantings are available from John Mason, c/- above.

Wilson G., *Landscaping with Australian Plants*, Nelson, 1975.

SECTION 2

LANGUAGE ARTS

90

LANGUAGE DEVELOPMENT AND ENVIRONMENTAL EDUCATION

Bernie Higgs

PREAMBLE

The author of this article holds strongly to the view that language is used to shape as well as transmit thought and so is the major means by which we make meaning of our environment. In pointing out that conversation is the language form that we use most comfortably as we grope towards new meanings and new understandings, he draws attention to the fact that the language of the classroom is rarely conversational and is the language for adults, not the language of children. The consequence is that an adult conception of the world is transmitted to children. To overcome the barrier to learning that this creates, he proposes the adoption of *exploratory talk* where children are able to develop understandings through discussion and consideration of their own experiences. How exploratory talk can be used for environmental education is illustrated through the case where children are requested to examine a street of old houses threatened by redevelopment. His concluding comments are worthy of stating at the outset for they summarise the position the article takes: 'We are not in the business of imposing our own model of the world but with introducing students to the processes by which they can make their own meaning of it. The journey is therefore more important than the arrival.'

LANGUAGE IN THE SCHOOL

By the time they start formal schooling, children have a well developed language of their own which they use effectively. This language develops further as children progress through the school, in part because the school feels it has a major responsibility for assisting language development, but a gulf eventually develops between the language of the school and the language of the children in it. By the time children enter secondary school, this gulf may have widened to the extent that the language of the school may form a barrier to effective learning.

The reasons for this are not difficult to find. School language is adult language. It is the language of textbooks and is formal, public and impersonal. It can be very much like the following, taken from a text in physical science:

> Water pollution control embraces a wide collection of devices or actions. For instance, mechanical, in-stream aeration provides dissolved oxygen to a stream and may be considered pollution control. The use of biodegradable detergents is a form of pollution control.

This is a far cry from the lively, personal, fluent talk of the playground, yet it is the medium for much of the talking and most of the writing that takes place in the classroom. When concepts like 'pollution control' are presented in a way that their understanding is dependent on an understanding of terms like 'mechanical, in-stream aeration', then it may well be that it is the

demands of the language and not the level of thinking required that impedes the children's understanding and conceptualising.

Differences between the language of children and the language of the school or adults derive from an obvious feature of our relationships with the world in which we live. From the outset this relationship is an active one. We do not sit and wait for the world to inflict itself on our senses. Rather, we explore and interpret what goes on around us actively, we try to make sense of this and we work to control it. As a consequence, we make our own meaning of the environment through constructing our 'model' of the world. This model forms the basis of our continued understanding and is our filter for receiving and processing new inputs and for evaluating known concepts. When children or adults meet new situations, they are simultaneously processing the known. Their interpretations of what is happening are influenced by the expectations they bring to the situation. In particular, the words they hear will be processed in terms of their own experiences—the words they speak will express the dimensions of that experience. Obviously the language a child uses will be his or her own. Adult language involves different experiences and expectations and will reflect a different model of the world.

Conservation and Learning

The most natural, and usual form of language use is conversation. This is the everyday language of adults as well as children and is important to learning about and understanding the world because its essential feature is that it is exploratory talk. Conversation has an obvious social function but it must be stressed that it is the main language form we use to explore the world. This is because it has the following attributes:

- It is the language closest to the speaker.
- It is hesitant, inexplicit and discursive.
- It is marked by false starts, rephrasings, and changes in direction, and hence it enables us to reshape our ideas as we go.
- As it is accepted for its shortcomings, the listener is tolerant of these features.

Conversation is therefore the language we use most comfortably as we grope towards new meanings and understandings.

The value of exploratory talk is recognised almost intuitively by parents. They let their very young talk freely, and delight in encouraging their explorations. They are good at this because the success of exploratory talk is dependent on the presence of a supportive environment within which the talk can take place.

For adults, conversation is at its most sincere when intimates talk or when the conversationalists experience positive feedback and response and when they are given the encouragement to relax and elaborate their views.

Experience of this sort of talk is the resource that all students bring with them to school. This being the case, the active encouragement of exploratory talk would seem to be an essential requirement of effective learning.

Exploratory Talk in the Classroom

Too often, classroom talk and discussions are dominated by the teacher. And it is not conversation or even real dialogue for it is based on the premise that the teacher's main task is the transmission of knowledge—knowledge that has been conceptualised from an adult point of view. A quick sketch of the classroom where the teacher dominates discussion may go something like this: the teacher talks, pupils listen; teacher asks questions, pupils attempt to guess the answer that they know the teacher already has in mind; teacher proposes an activity, pupils investigate matters the teacher knows all about; the pupils give the resultant information back to the teacher in a talk, project, or essay, attempting to match the teacher's way of expressing things as closely as possible.

What is needed to introduce real and effective learning into the classroom is to allow the full use of exploratory talk. The cornerstone of this is the realisation that language is the major means by which we make meaning of our world. We must realise that language is used not merely to transmit thought but that it also shapes thought. Exploratory talk requires the teacher to create situations where children are encouraged to:

- use their own language to explore, recall, predict, plan, analyse, report, and create
- use exploratory talk to think aloud
- work in an environment where change, modification, supposition, suggestion and challenge can take place, and where tentative and new ideas can be tried out in supportive, encouraging situations.

An excellent medium for achieving these ends is to have children work in small, supportive peer groups.

ENVIRONMENTAL EDUCATION AND EXPLORATORY TALK

To demonstrate how exploratory talk can be used, let us consider the case where children are required to examine a street of old houses threatened by redevelopment. This example has been used in the film *Talking to Learn* produced by the Western Australian Education Department. The teacher wants the students to explore such aspects as what it is like to live in the street, whether the buildings should be retained, and what the impact of redevelopment on the area might be. Whatever approach is used, a good deal of activity will occur before children explore the area and offer their opinions. For example, reasons for undertaking the study will need to be considered, some preliminary reading may be necessary, procedures for carrying out the fieldwork and recording the results will have to be discussed. Throughout all activities, the teacher will need to take careful account of the language experiences that take place. Great care must be taken to ensure that the proceedings have been conceptualised adequately from the child's point of view which means that a number of organisational traps need to be avoided. The very structure of the program could mean that the teacher imposes an adult viewpoint on the children's learning for, without consulting them, he or she might decide such things as the geographical extent of the project area, the nature of the preparatory reading, the forms the recording and reporting of the results might take, and the student assessment procedures.

From the beginning of the project, children should be given opportunities, preferably in small groups, to engage in exploratory talk about the venture and the problems and issues it involves. Limited though this may be in terms of background awareness and knowledge, it does provide the base from which the needs or purposes of the project, as seen by the children, can be articulated.

This early talk will be loose, ill-informed, unstructured, and probably illogical, but real understanding about what is important in the project, even why it is being undertaken will be given the chance to become firmly linked to the present understandings and awareness of the world experienced by each child.

Each stage of the project as it develops into fieldwork, the evaluation of the research information, comparisons with similar situations, preparation of the material for reporting, and so on, should be based on a foundation of exploratory talk. By discussing the material with peers, explaining what they think is meant by a particular point, and, in turn, listening to explanations offered by others, students will begin to create understandings and feelings of relevance that can never be imposed or created by the teacher.

It cannot be emphasised strongly enough that the introduction of any new area of learning, and particularly if it is concerned with the development of attitudes and the clarification of values, should be accompanied by, and founded upon, the child's own language. Unless children can use their everyday language to deal with and come to terms with knowledge, ideas, experiences and values, and to relate these to their accumulated experiences and understandings of life, they will be deprived of an essential means of educating themselves.

Anticipating Problems

However much we accept the centrality of the children's language to their learning, we are likely to have reservations about the degree to which it applies. Two worries are particularly common:

- The concern that student talk will inevitably become locked into the limitations of the children's language.
- The fear that the children's work might direct them towards an unrealistic attitude and a distorted view of the topic they are investigating.

The first of these worries can be countered in two ways. Firstly, it must be recognised that language use varies with function. We use different language in different situations according to the demands made upon us. Children are well aware of this and in fact practise it all the time for they speak to their peers very differently from the ways they speak to adults. All children soon learn to obey the varied social conventions of conversation. When school talk is dominated by adult language, the function is almost always related to the teacher's dominant role and most talk is directed towards the teacher. Children are given very little opportunity to develop a range of language use which will equip them to adequately communicate their views to a real audience.

When the time comes in the project for the students to act upon their research, to interpret their findings, to evaluate their responses, and to report and exchange their attitudes, the teacher's task should be to create real situations where the reporting and the debating and exchanging of opinions might take place. For example, the students investigating the

proposed street redevelopment should be encouraged to make their report to the local council. Not only does this give the project an air of relevance, but it will demonstrate most effectively the power of language at work, even if this arises from the frustration students feel because they cannot express their views adequately.

Secondly, encouraging exploratory talk does not prohibit the teacher taking a positive role in the development of language skills. Quite the reverse is true for there are ample opportunities for the teacher to enhance the development of language in indirect ways by being patient, by observing, by listening as talk progresses, and by encouraging a supportive climate in the classroom. There will be ways of prompting and reminding, of suggesting that there are alternative ways of expressing things ('historical' rather than 'olden time'), without accusing children that their wording is wrong. And there will be times when the teacher is involved directly. This applies particularly to the introduction of new or unfamiliar terminology. Subject specific language is necessary of course because of its exactness in the expression of abstract concepts or as a shorthand form of a whole list of ideas. However, the concept must be understood before the term is introduced and applied. The word 'redevelopment', for example, will mean little until students have experienced its meaning through observation and discussion. It follows that the development of language skills will be most effective where learning has a real purpose and when there is a real sense of audience.

The concern that children will develop distorted views through exploratory talk has already been part countered by what has been said about real intentions and real purposes. If the intention is to have children really evaluate the situation, then the needs must come from them—they must determine what they need to know in order to make a decision. Having arrived at some judgments, who will be interested in hearing them? If there is a sense of real purpose, then students will be challenged to be realistic. Besides, the assumption that all children think alike and will therefore arrive at the same judgmental positions is clearly false. There are many influences at work on their models of reality and exploratory talk with peers will expose these differences. This is why exploratory talk is so essential for the clarification of values.

In normal conversation, in addition to the string of narratives that make up so much of our daily talk, we try out our beliefs, ideas and values directly and for response. Some conversations are such that the socialising element is dominant and we are reluctant to expose our ideas. In other situations, especially where a purpose and focus exist, we are prepared to challenge others and to have our views challenged in return. This challenge and response requires a supportive environment which can only come about when there is a common task. The task is the essential ingredient that gives exploratory talk the beginnings of purposeful talk which, in turn, is the beginnings of clarifying the issues. The worry that children will cling to only one view denies the ways in which we interact and assumes that there is only one correct model of the world.

Finally, and most importantly, we do not expect children to arrive at any one destination in any one project. As environmental educators, we are concerned to help children make their own meanings of the world so that they can live more fully within it. We are not in the business of imposing our own model of the world but with introducing students to the processes by which they can make their own meaning of it. The journey is therefore more important than the arrival.

ENVIRONMENTAL AWARENESS IN CONTEMPORARY AUSTRALIAN CHILDREN'S BOOKS

Anne Hazell

PREAMBLE

Writers of works of fiction consciously or unconsciously reflect the views and values of the societies to which they belong and which they portray. A growing understanding of the nature of the Australian environment and an appreciation of its subtleties is reflected in writers' portrayals of the Australian landscape and of peoples' response to it. This document examines the means writers have used to develop an empathy between the young reader and the environment through a review of children's books in the six to fourteen year age range written since the early 1960s. The volume and quality of material published in that time makes it clear that the art of educating children to feel for the environment through literature is well developed. It is also clear that a didactic approach in literature, evident in recent years as society's concern for the conservation of the environment has increased, is self defeating. This may be a point of considerable importance in those other curriculum areas where the development of empathy with the environment is a major objective.

INTRODUCTION

Since the early days of European settlement of Australia, it has been apparent that the landscape has had a stimulating effect upon artists and writers. Early painters such as Conrad Martens and John Glover struggled to come to terms with unfamiliar plants and animals bathed in a much stronger light than in Europe; Banjo Paterson and Adam Lindsay Gordon used the rough, untamed landscape to complement their rough, untamed characters; novelists Henry Handel Richardson and, more recently, Martin Boyd portrayed people torn between their love for the European and Australian landscapes and cultures. Similarly, early children's authors Ethel Turner and Mary Grant Bruce wrote books in which bush settings played a major role although in fact, in an already urbanised society, this setting was unfamiliar to many of their readers.

'Mr. Percival and Storm Boy' from Seal edition of ***Storm Boy*** *by Colin Thiele with photographs by David Kynoch. Reproduced with the permission of Rigby.* ***Storm Boy*** *contains the most poignant, thought-provoking plea for the environment yet seen in Australian children's books.*

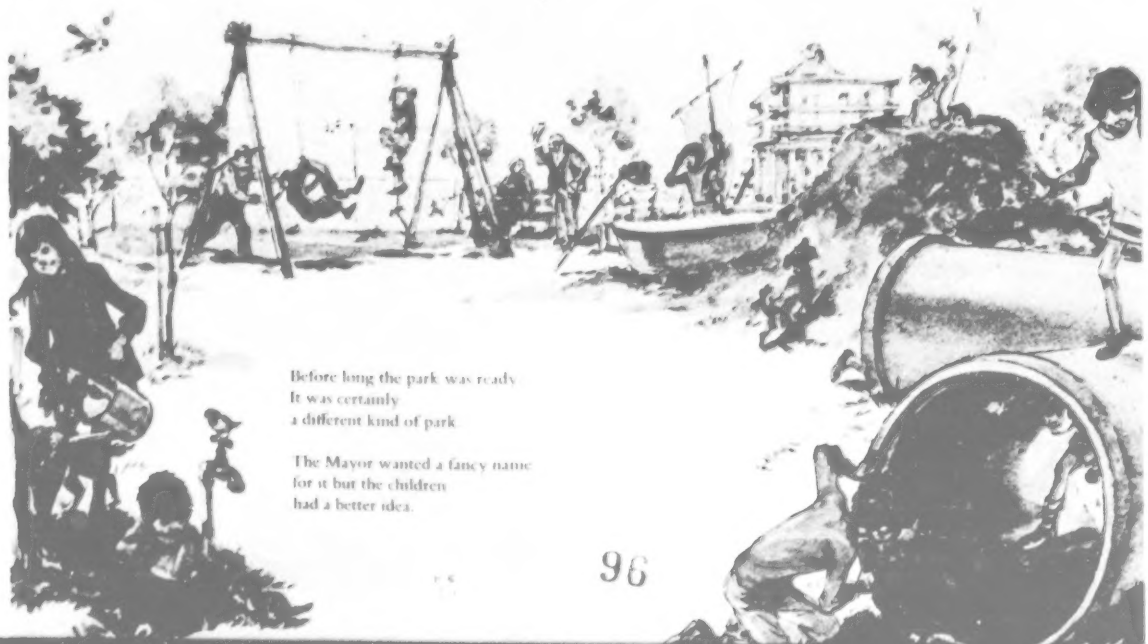
Many of these early books were distinctively Australian, complete with bushfires, Aboriginals, floods and kangaroos, but man was usually seen struggling against the land in an attempt to subdue it and make it a suitable place for women and children to live. This lack of concern for nature in the writings of Australian authors was mirrored in the works of their overseas contemporaries. The Depression, the world wars and the subsequent flood of refugees were favourite themes until the middle of the twentieth century and distracted authors' from examining the changing threats to the landscape. The situation has now changed and in the following article reference is made to some of the contemporary Australian children's fiction in which the authors both explicitly and implicitly show their sympathy for their physical surroundings.

CONSERVATION

Colin Thiele's response to his surroundings was already apparent in such early regional novels as *The Sun on the Stubble* which brought to life the German community in the small settlements north of Adelaide. Closely linked to this spirit of place is an awareness of the responsibility which people assume when interacting with their surroundings. *The Sknuks*, a picture-book published in 1977, is an impassioned plea to children to save the earth from the ravages of pollution. Primary children already introduced to this theme in Foreman's *Dinosaurs and all that rubbish* and Brennan's *Olaf's Incredible Machine* could not fail to understand Thiele's message, reinforced as it is by Mary Milton's dramatic illustrations. However, whether their consciousness is raised by the strong moralising and didacticism is another matter. Similarly unsubtle is Greenwood's *V.I.P.* (Very Important Plant), an earlier book for this age group, about a tree whose life cycle is brought to an abrupt halt by a carelessly started bush fire. Greenwood attempts to soften the blow by finishing his book with the seed once again germinating as at the beginning of the story. However scientifically accurate this may be, much of the conservation message is lost in the regrowth image. Far more effective in achieving its goal of consciousness raising is *Keep Out* by Noela Young, a picture book which tells about a group of city children who create an adventure playground on a demolition site. Attractive watercolour illustrations support the simple text in which Young tells a story with immediate relevance for urban (and some suburban) children who have nowhere to play. Playgrounds are familiar to many Australian children and the creation of one out of unwanted debris and rubbish is both appealing and credible. In fact, it is probable that, in our urbanised society, books such as these are more meaningful to Australian children than are those set in the bush or in small country towns.

Two novels for older children which use the city as a background are Joan Phipson's *Keep Calm* and Mary White's *Breakup*, both of which are thought-provoking stories about some of the problems of urban living. *Keep Calm* is a frighteningly realistic novel about a general strike in protest against the building of a nuclear reactor at Botany Bay. Sydney slowly grinds to a halt as transport, electricity and communication services cease, leaving two children stranded in their high-rise apartment. Looting and violence

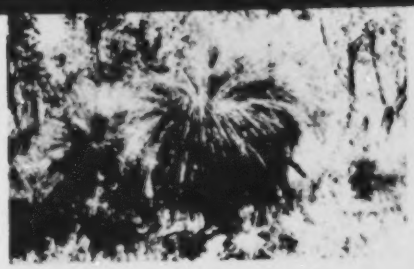
'The adventure playground' from ***Keep Out*** *by Noela Young. (C) Noela Young. Reproduced by permission of Collins Publishers.*


Before long the park was ready.
It was certainly
a different kind of park.
The Mayor wanted a fancy name
for it but the children
had a better idea.

become everyday occurrences, but Sydney Harbour, empty of ships and untouched by petrol fumes, reverts to its appearance before the arrival of the white man, 'dark, secret and brooding'. Even during the short time-span of the book, grass grows and the city begins to revert to its original appearance. Phipson's message about the transience of civilisation in an ancient environment is interesting, if alarming.

Breakup is less subtle but equally effective as White describes the actions of a group of Sydney children whose street is threatened by a new highway. Initially the children's protest marches and letters gain them valuable publicity but, later in the book, disillusioned both by their lack of impact upon the bureaucrats, and by their parents' apparent apathy, the children run away. While this ending is realistic, the author's cynicism at times upsets the unity of the plot and obscures her purpose.

Moving away from the city towards the bush, several contemporary authors have looked at the protection of national parks and sanctuaries. Young readers will sympathise with Nance Donkin's small hero in *Yellowgum Gil* who is sent to his grandparents' home to recuperate after a bad case of measles. Fortunately the grandparents live in western Victoria on the edge of a national park where Gil learns much about the local plants and animals from his wise grandfather. All the family is angered by the motor bike riders who leave a trail of destruction through the park and it is through Gil that the culprits are brought to task. This theme was explored for older children by Patricia Wrightson in an early work *The Crooked Snake* where a gang of children find a beautiful sanctuary, complete with bell-birds, goannas and tree ferns. The threat in this case comes from some older boys who plan to shoot the animals and damage the trees. As in her later books, this author writes an exciting adventure story into which she weaves both the conservation theme and a broader theme about community involvement as the children survey local industry and agriculture. A similar book for the ten to fourteen age group is Sue Couper's *Pelican Point*, an attractively illustrated story, in diary form, about a group of cousins who go on a camping holiday without their parents. Written less skilfully, *Pelican Point* could have become a manual on how to camp but Couper succeeds in creating a convincing set of characters over a wide age range who share their experiences with the reader pleasantly and naturally. Under the direction of older children, the whole group develops greater self-reliance as well as



Grass Tree - Ed.

Boys' Tent (and washing) -Ed.

Banksias - Ed.

'Entries in the diary' from ***Pelican Point*** *by Sue Couper, illustrated by Patricia Mullins. Reproduced with the permission of Hodder & Stoughton, Australia.*

learning about the flora and fauna of their interesting camping place. Less satisfying is *Gecko Gully* by Enid Conley whose knowledge of her setting on the coast of New South Wales is undeniable but whose ability to create characters and tell a story is questionable. When the local council threatens to extend the rubbish dump into Gecko Gully Willie is shocked, since the gully is his escape from the problems of everyday existence. Unfortunately the reader's sympathies are not fully aroused since the author fails to bring her landscape to life.

That man's effect upon the environment is capable of destroying not only physical surroundings but also the life style of the inhabitants, is shown in two other stories for this age group, *They Drowned a Valley* by Margaret Paice and *The Year of the Currawong* by Eleanor Spence. As is indicated in Paice's title,

the setting is a sparsely populated area where a large dam is to be built. Paice has little to say about the environment itself but paints a realistic picture of the effects of the flooding upon an old lady, born and bred in the valley, a teenage girl about to start high school but who now seems doomed to correspondence lessons, and other children whose parents are forced to seek work elsewhere. Progress in the form of a motel appears likely to destroy the peace of Spence's Currawong Crossing, a small town in New South Wales, whose main claim to fame is a deserted silver mine. Efforts by a group of children to trace the history of the Crossing culminate in a Back-to-the-Crossing day, complete with historical pageant. Their hard work is rewarded when the plans to build the motel are withdrawn (rather unconvincingly) leaving the few inhabitants to their usual peaceful existence.

Joan Phipson's novel *The Cats* is basically an adventure story with elements of fantasy. When their parents win a lottery, two boys are kidnapped and taken to a remote shack in the bush near the small town where they live. Initially the sophisticated kidnappers are in complete control, frightening the boys into submission with a gun. Gradually, however, one of the boys gains the upper hand as his almost mystical relationship with the environment becomes apparent. Nature itself seems to co-operate with Willie as the wind blows incessantly, trees fall and the kidnappers cringe before their hostile surroundings. At the climax of the story, the mysterious feral cats which have been following the group attack the kidnappers seemingly at Willie's command. It is difficult to imagine a more impressive exposition of the balance of nature and the disasters which can happen if this balance is destroyed. The landscape's support of good, in the form of Willie and Jim, and its hostility to evil, the kidnappers, is effectively symbolic.

LIVING THINGS

The books mentioned so far have looked at the broad issues of conservation and the relationship between people and the Australian environment. As well as these broad overviews, many writers have focused on the threat to specific trees, mammals and birds.

Writing for children who have only recently learned the basic skills of reading has long been recognised as difficult. One Australian author who has mastered this area without falling into the stilted style and flat characterisation of the basal readers which form a major part of the reading diet for this age group is Christobel

'The lizards escape' from ***Lizard Log*** *by Christobel Mattingley, illustrated by Helen Sallis. Reproduced with the permission of Hodder & Stoughton, Australia.*

Mattingley. Three of her books published in the mid 1970s are concerned quite explicitly with the theme of conservation—*Show and Tell*, *Lizard Log* and *The Battle of the Galah Trees*. The appeal of *Show and Tell*, which is profusely if rather unimaginatively illustrated, lies in the familiarity of the topic for younger children faced with the need to produce interesting objects to talk about to the class. Robert's contributions range from wheat seeds growing on cotton wool to live tadpoles, all in sharp contrast to the other children's dolls, cars and stamps. His final 'show and tell' session takes the class out of school into the scrub where he has found a robin's nest complete with baby birds. With this action Mattingley points out that it is possible to compromise between the desire to make people aware of their surroundings and the need to leave precious plants and animals in their natural habitat. *Lizard Log* is a short story about a family's summer camping holiday which is dominated by the son's exploration of the world of lizards. Attempts by two men to capture the lizards to sell in pet shops are thwarted by Tony, with the help of a large goanna. For older children *The Battle of the Galah Trees*, set in Adelaide's eastern suburbs tells of a young boy's efforts to save a row of huge old gum trees at a nearby sports ground. Mattingley cleverly weaves together the relationship between the trees and the boy's pet galah as well as other local fauna which will be lost if the trees are removed. Suggested too is the value of involving the media in such struggles to influence local and State Government officials. All of Mattingley's books support her philosophy about conservation: 'For me the creatures of

nature were always sacrosanct . . . living is not plucking and gathering, having and holding, collecting and keeping but being aware and open in all one's five senses, responding with mind and spirit, loving, and giving' (*Reading Time* 63, April 1977).

This philosophy is reiterated in *Uhu* by Annette Macarthur-Onslow, an Australian author-illustrator, although this book has an English setting. Uhu is a tawny owl who falls out of the nest and becomes part of Macarthur-Onslow's family for five short months. In spite of loving attention Uhu dies, partly as the result of accidents caused by osteogenesis-imperfecta or brittle bones. The loving care lavished on baby Uhu had not included enough calcium. As the author herself says, 'Had I known then what I know now, Uhu might have survived a little longer and might have gone back to his wild state and lived a normal life'. Magnificent illustrations enhance this sad little story with its moral about the disastrous results of well-meaning ignorance. There is very little well-meaning about the character in Phipson's latest book, *The Bird Smugglers*, a high adventure story about a teenage girl who finds herself witnessing an attempt to smuggle some Australian parrots to Europe. The background against which the attempt takes place, a jumbo jet trip from Sydney to London, is realistically drawn but the plot itself is contrived. It seems that Phipson's involvement with her topic has led to a dimming of her usual objectivity and far too much coincidence strains the reader's credibility. Nonetheless the subject is of contemporary relevance and, as is stated in the afterword, it is essential that children should become aware of such cruel rackets as this.

In his early books Thiele effectively used humour to support his message about environmental awareness. *Gloop the Bunyip* is a long, illustrated poem about a bunyip whose life is disturbed by the arrival of white settlers bringing the benefits of civilisation to the outback. Not only are these people unimpressed by Gloop's terror-inspiring performances but they are accompanied by:

> Electric wires,
> Tarry roads
> And screeching tyres
> With urgent loads;
> Instead of ducks
> And gunyah fires,
> The oily mucks
> Of diesel trucks.

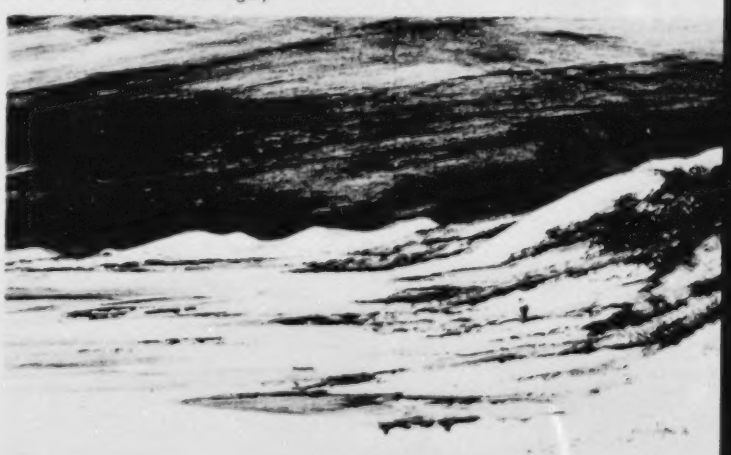
Eventually Gloop seems destined to spend the rest of his life in the zoo and is saved only by a flood which sweeps him away from the source of the threat. *Yellow-jacket Jock* has a similar river setting, the locale this time being somewhere in South Australia where the River Murray winds through high cliffs. Clifton Pugh's interpretation of Thiele's landscape does much to add weight to this short story about a boy and his cockatoo who find their peace shattered by water-skiers. This book, published in 1969, ends in uneasy co-existence with the skiers restricted to one section of the river while Jock and his family, the pelicans, swans and cockatoos continue as before in an area now declared a sanctuary.

THE AUSTRALIAN LANDSCAPE

Storm-Boy, arguably Thiele's finest work, contains the most poignant, thought-provoking plea for the environment yet seen in Australian children's books. Characterisation, although excellent, is secondary to the author's skilful evocation of the Coorong region of South Australia and its inhabitants, both human and natural. The South Australian Film Corporation did justice to this fine story in the film of the same name with the exception of the section where the dune-buggies invade the sand hills. The subtlety of the book's message is temporarily destroyed and is replaced by overt didacticism and sensationalism.

Just as Thiele presented the South Australian landscape to the world, so did Nan Chauncy with the Tasmanian landscape. All of her writing is distinctively Tasmanian, especially those

'The Coorong' from the Opal edition of ***Storm Boy*** *by Colin Thiele illustrated by Robert Ingpen. Reproduced with the permission of Rigby.*



works set in the rugged south-west. *Tiger in the Bush* is, of course, about that probably extinct animal the Tasmainian tiger, hunted by the early white settlers and now the subject of world wide scientific interest. Conflict arises in a boy whose home is in a remote valley when he meets two Americans who are searching for the Tasmanian tiger. The strength of this novel lies in Chauncy's convincing portrayal of a boy torn between his love for his surroundings and his wish to help the glamorous strangers from the outside world. Chauncy's solution to the dilemma is realistic, revealing both her understanding of children and her attitude to her home-land.

The Tasmanian tiger is one of the animals threatened by man in Hesba Brinsmead's novel for teenagers, *Echo in the Wilderness*, a thinly veiled description of the flooding of Lake Pedder. As with all this author's books, one must admire the thoroughness of her research and her enthusiasm for her cause. Admirable also is the convincing picture of the south-west background against which the plot takes place, but less praiseworthy is the strongly moralistic tone which Brinsmead adopts. It is difficult to believe that young people will respond positively to being preached at, whether about conservation or any other social issue. Another book by Brinsmead about an almost extinct animal is *Isle of the Seahorse*, this time with a Barrier Reef setting which gives the author the opportunity to expound upon threats to the Reef from the Crown of Thorns starfish and oil exploration. However Brinsmead's main thrust in this novel is even more exotic than the Reef itself—she creates a strange little horse, a descendant of some long ago castaways, which befriends the young heroine and her ship mates when they too are wrecked. Once again the message about man's treatment of endangered species is treated heavy handedly, although as in *Echo in the Wilderness*, the setting is powerfully evoked. Far less didactic and much more effective is the same writer's autobiographical novel, *Longtime Passing*, about her childhood in the Blue Mountains. Conservation is not her main objective yet the reader becomes aware of the majesty of the great trees which had not yet been cleared by the axe and the cross-saw. Brinsmead's family earned their living as timber fellers but, with far less sophisticated instruments of destruction than are now available, their impact on the environment was correspondingly less devastating. Brinsmead's strength lies in her ability to capture the atmosphere of the areas about which she writes. Her weakness is in her tendency to people these areas with stereotypic characters committed to causes—among others, conservation.

Mavis Thorpe Clark is another contemporary writer who mars her novels by her overt didacticism. Again writing for teenagers, Clark sprinkles her novels with characters who become alienated from friends and family to support such causes as saving the mutton-birds on the islands in Bass Strait. The teenagers in *The Hundred Islands* have been brought up to accept the annual slaughter of the mutton-birds as an integral part of the island's economy. When two of them question the ethics of the killing, they meet a hostile response from many of the island's older inhabitants who supplement their small incomes by taking part in the slaughter. Clark's ability to create realistic family situations with which teenage readers could identify is overwhelmed by her insistence upon allowing her characters to lecture their readers, again often about conservation.

BUSHFIRES

From the beginning, the Australian children's novel has been the vehicle for dramatic, terrifying descriptions of bushfires usually caused by careless city slickers who don't know any better. In earlier stories, these fires offered the opportunity for heroic actions in which people or domestic animals were saved in a nick of time e.g. Phipson's *It Happened One Summer* and Hester Burton's *No Beat of Drum*. (The latter is not by an Australian author and was published in 1966 but, in this respect, is an interesting throwback to the attitudes towards bushfires rampant in some early Australian works.) *Family at the Lookout* by Noreen Shelley has some of the traits of the 'brave acts of derring-do' school of writing about bushfires but it also has something else. The Blue Mountains setting is well suited to the drama of fire sweeping through thickly wooded valleys, threatening small settlements and scattered houses. While the human inhabitants and domestic animals are Shelley's main concern, it is a tribute to her creative talent in the earlier section of the book, where the surrounding bushland is described, that the reader is aware of the danger threatening this part of the environment too.

In 1965 it was a good year for bushfire books with the publication of Thiele's *February Dragon* and Ivan Southall's *Ash Road*, the winner of the Australian Children's Book of the Year Award for that year. As would be expected, Thiele's bushfire story is dramatic and to the point, pulling no punches about the results of carelessness with matches. Aunt Hester, the cause of

the disaster, is dismissed, summarily perhaps, as being too old to change her ways. Southall's novel, on the other hand, is a masterly analysis of the effects of guilt upon the boys who start the fire which spreads through Victoria. In parts, *Ash Road* tends to drag but Southall's descriptions of the fire and the reactions of the people whose existence is threatened by it are dramatic. Clark's bushfire novel, *Wildfire*, combines brave acts with guilt altnough eventually the guilt proves to be unfounded. Holiday makers at resort towns on the coast of Victoria are threatened by forest fires which destroy communication with the rest of the State. The work of the local volunteer fire service is an important and well-researched aspect of the book. However, it is left to a much shorter book to provide the most horrifyingly realistic picture of an Australian bushfire and its effect upon the native flora and fauna. The simple text in Ivan Smith's *Death of a Wombat* is reinforced by Clifton Pugh's superb paintings which show a bushfire racing through a helpless animal community. The text contains no impassioned cry to take care in the bush nor does the ending wallow in sentimentality over the fate of the lovable wombat. Rather, Smith allows the drama of the situation to be revealed in the illustrations, using the text as a kind of background chorus to fill in the gaps.

THE SEA

Another group of creatures at present inspiring righteous indignation in the hearts of Australian children's authors is the inhabitants of the sea. The reasons for this are numerous, but, whatever the reason, for unadulterated, unappealing didacticism it would be hard to ignore *The Mermaid Attack* by David Martin who plunges the reader into a unconvincing fantasy complete with mermaids with detachable tails, porpoises trained as spies by wicked American military officials and whales hunted by equally wicked Russians. Despite their harsh treatment, the whales unite to lift a crippled atomic submarine off the ocean floor, showing their love for their fellow sea creatures. Such explicit moralising does service neither to the cause of the conservationists nor to the children who may read such incredible nonsense. Older readers too have their whale story, *Musco—Blue Whale* by Vincent Smith, an 'unashamedly emotive plea for the conservation of the blue whale (in) the form of a whale's eye view of man's intrusion into the whale's dominion' (*Reading Time* no.70, Jan. 1979). More believable than *The Mermaid Attack*, *Musco—Blue Whale* nonetheless does not entirely avoid the pitfalls of sentimentality which, in the field of children's literature, previously characterised the *Black Beauty/ Lassie Come Home* style of writing.

As was seen in Brinsmead's *Isle of the Sea Horse*, children's authors at the moment seem to believe that one of the greatest threats to marine life comes from oil exploration. Both Hugh Edwards in *Sea Lion Island* and Colin Thiele in *Albatross Two* deal with the undesirable side effects of this aspect of progress. *Sea Lion Island* in one of Edwards' *Sea Witch* series of high interest/low reading level books designed to appeal to the reluctant or possibly retarded upper primary-lower secondary child. A remote sub-Antarctic island is home for a colony of a special breed of sea lions, the subject of a study by the World Wild Life Organisation. The children from 'Sea Witch' help WWLO in their flight against MEGLA, a multinational oil exploration company whose base is planned for the only section of the island where the sea lions can mate and whelp. As with Smith, Edwards' motives are irreproachable, but allowing his young heroes and heroine to strand the managing director of MEGLA on a rock which is covered by water at high tide in an attempt to blackmail him into leaving the island, is far-fetched to say the least. Clear delineation between good and bad characters leaves the reader with the impression that the end justifies the means in the area of conservation, an undesirable over-simplification with nasty implications.

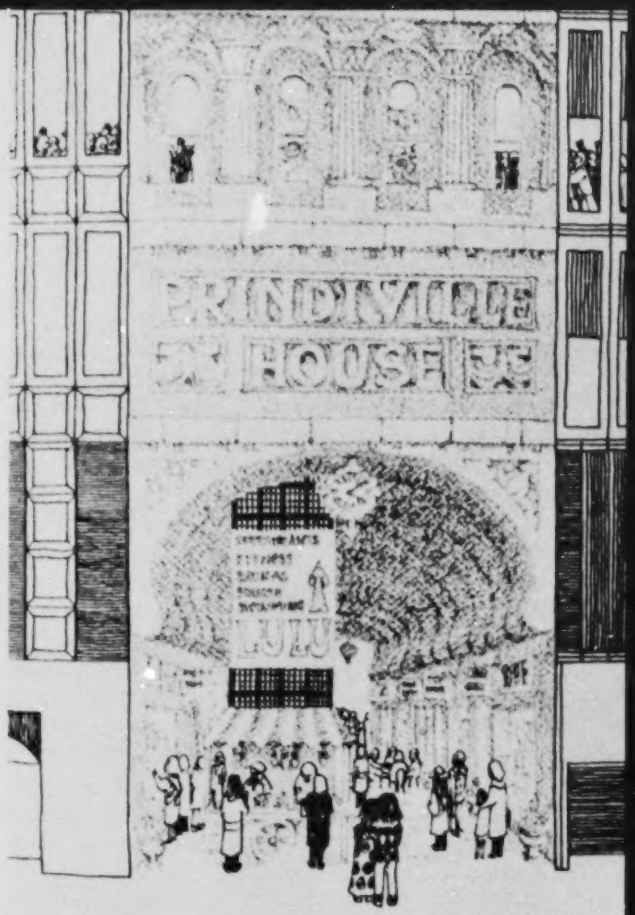
Perhaps because his setting is more familiar, Thiele's *Albatross Two* is more believable as a story about oil exploration, in this case off the south-east coast of South Australia. Shades of grey are apparent in both the characters and the effects of the arrival of the oil rig upon the small town and its inhabitants. One family is split when the son accepts a holiday job on the rig as a cook's assistant, much to the horror of his younger sister who feels that the presence of the rig can only be harmful. Her presentiments prove accurate when a dramatic blowout results in oil pouring into the sea destroying the livelihood of the local fishermen and killing many sea creatures. Thiele focuses upon the fairy penguin as the major victim of the oil slick and succeeds in building sympathy for the tiny animals in their struggle for survival.

THE BUILT ENVIRONMENT

Awareness about conservation in Australia extends beyond flora and fauna to include old buildings and other objects from the past. For

some buildings this sympathy has come too late but for others the efforts of people, aware not only of their beauty but also of their historical value, have resulted in their preservation and often restoration. Greenwood's *Joseph and Lulu and the Prindiville House pigeons* is a picture book about an ornate office building with only a few tenants, wedged between two towering office blocks. Lulu, the lift in Prindiville House, and Joseph, the lift-driver, are at the centre of the campaign to prevent the old building being torn down as its huge neighbours expand. In Greenwood's illustrations, Prindiville House is seen as graceful and delicate alongside the stark, uninteresting outlines of the modern buildings. The solution to the problem sees the old building transformed to a recreation centre for the occupants of the office blocks who are glad to escape from their air-conditioned, glass boxes into the more natural environment of Prindiville House. In picture-book format also, although with more sophisticated text, is Graham Jenkin and Will Mahony's rollicking poem *The Famous Race for Wombat's Lace*. When the mayor, whose appearance suggests he would be more at home in Texas than in New South Wales decides that Wombat needs to attract more tourists, a reconstruction program is planned with the aid of tractors, saws and concrete. The final straw comes when the town's iron lace is removed, provoking the wrath of the local teacher and four of her students who set off in hot pursuit to rescue the lace from the furnace. Fortunately they succeed, and even more fortunately, the tourists are most unimpressed by the new Wombat with its pizza parlours and hamburger joints and without its iron lace. Wombat returns to its previous sleepy existence and the lace is replaced. Nonetheless everything is not quite the same as before: 'The creek will never come back to life—it will always be a drain', and 'The air of timeless beauty seems impossible to restore'.

Two stories in which the restoration of an old building is closely linked with the problems faced by adolescents in their conflicts with their families are *Callie's Castle* by Ruth Park and *Cocky's Castle* by Celia Syred, both of which were Highly Commended in the Australian Children's Book Award. *Callie's Castle* is set in suburban Sydney and tells the story of a girl whose widowed mother has remarried, providing Callie with a very small stepbrother and sister. As adolescence approaches, Callie finds their constant presence unbearable especially since she has no privacy, nowhere which is really hers. The solution is found in the tower of their rambling old house which Callie's



They removed two floors and made an arcade.
They punched doorways through the tower walls

'Prindiville House' from ***Joseph and Lulu and the Prindiville House Pigeons*** *by Ted Greenwood is reprinted by permission of Angus & Robertson Publishers.*

grandfather restores, giving Callie a place where she can escape from both the adults (who are too big to climb the ladder) and the smaller children (who are too small). The details of the restoration are lovingly described, making the house as important a part of the story as Callie herself. *Cocky's Castle* (1967) tells the story of a sensitive pre-adolescent girl who is often left out of the activities organised by older members of her family until her artistic ability leads her to involve the whole group in the restoration of *Cocky's Castle*, an old house nearby, as an entrant in a competition for historic homes. Although the house wins second prize, the old lady who owns it is unable to afford its upkeep and it seems that the area will become part of a caravan park complex resulting in the destruction of a so far untouched piece of scrub adjoining the house. Before this can happen, however, an electrical fire causes the house to burn down, the caravan people lose interest, and the new owner of the land gives the scrub to

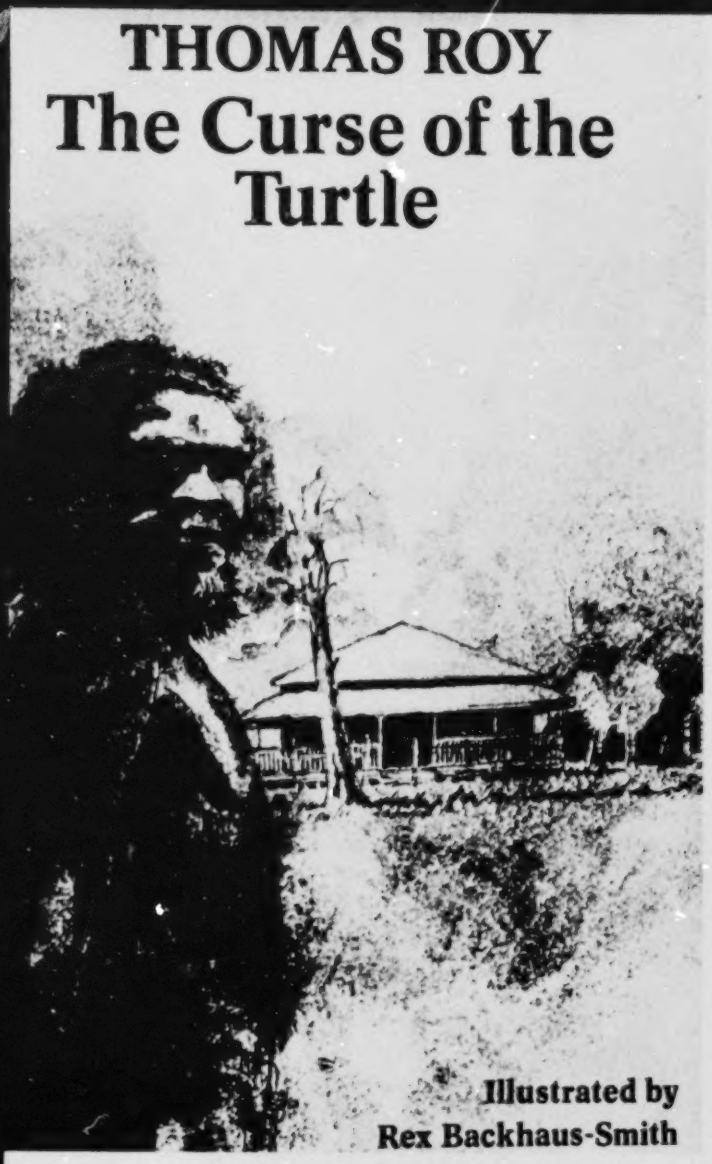
the nation as a National Park. Outlined as briefly as that, Syred's story sounds rather trite and overloaded with coincidence but the character of Fran, a gentle, sensitive girl, redeems the story. One aspect which does date the book, however, is the subservience of the female characters who are a far cry from the independent, strong-willed heroine of *Hebe's Daughter*, Syred's latest novel.

Both Mattingley and Thiele have turned their hands to stories about the conservation of manmade objects, Mattingley in *The jetty* and Thiele in *The Hammerhead Light*. Mattingley's hero is not a whole-hearted conservationist as far as the local jetty is concerned. He associates it with the drowning of his fisherman father and is afraid every time he is forced to walk along it which is often since the old jetty is the social centre of the small town on the coast of Eyre Peninsula. When the Department of Marine and Harbours sends divers to check the jetty's safety, Brad is secretly torn between his hopes that they will condemn it and his awareness of the importance of the jetty to his friends and the other people in the town. The jetty proves to be quite sound and becomes the main attraction in a fishing competition designed to attract more of the much needed tourist industry to Kanbi Bay while the friendship offered by one of the divers gives Brad the self-confidence which he needs. On the other hand, the ending of *The Hammerhead Light* is far more serious. When an electric beacon takes over the work of the old lighthouse, both the building and the lighthouse keeper are no longer considered useful. Once again the main character is a lonely young girl, reaching the end of her primary school days and realising that she will have to leave the fishing port on the south-east coast of South Australia. She tries valiantly to save the lighthouse and her old friend but loses both when a violent storm wrecks the building and the old keeper, injured in the storm, is sent away to an old folks' home.

Other objects which have attracted the attention of authors are an old boat, a 1913 Deutsche-Adler vintage car and a steam-engine. Finkel's *The stranded duck* and *Operation Aladdin* are small readable books filled with practical hints about salvaging and restoring machinery. Emphasis in both stories is on the high level of the craftsmanship and materials in the vintage machines. Woven into this appreciation of objects from the past are reasonably exciting stories carried along by a group of believable characters including both the boys and their grandfather. *Come Midnight Monday* by David Burke combines two aspects of conservation in that the purpose in restoring the old steam engine, Wombat, is to prove its value as a non-polluting method of transporting ore from the ranges. Not only the engine but also the railway line on which it travels must be restored as part of the campaign to prevent the building of a new highway. The dust-jacket says that Burke (a journalist) is a train enthusiast, as indeed is apparent from the book, but the result is rather too fraught with indignation to have wide appeal.

ABORIGINALS

From a discussion about the landscape and the objects in it, it seems logical to move to the original inhabitants of Australia and their place in contemporary society. Australian children's authors seem to have been very self conscious in the past when writing about the Aboriginals. Passing references to cave paintings in Phipson's *It Happened One Summer* and Donkin's *Green Christmas* were of very little importance to the plot although both authors paid credence to the need to protect such relics from the ubiquitous tourist. However Nan Chauncy's *Tangara*, about the fate of the Tasmanian Aboriginals, was a masterpiece on this topic. In both *Tangara* and the lesser work, *Mathinna's People*, Chauncy's sympathy for the Aboriginal people is apparent as she tells her story of their death at the hands of the white settlers. The effective use of the time travel device in *Tangara* makes it one of Australia's most successful fantasies, as well as a powerful study of the relationship between a lonely little girl in the Western Tiers and her black playmate. More recently, *The Tribe with no Feet* by Vivienne Rae Ellis has been set in a similar background in a straight historical novel for younger readers showing the effects of the arrival of the white settlers in Hobart upon the Aboriginals and foreshadowing the horrifying events described by Chauncy. At the other end of the continent, *The Curse of the Turtle* by Thomas Roy examines the relationship between black and white on a cattle station. This is a powerful, grim book in which the author's views about sacred Aboriginal land are quite clear, offering no sympathy to the white man who trespasses, knowingly or not. Many authors who write about the Aboriginals describe the strong links between the people and the forces of nature with which they seem able to combine in times of danger. Typical of these awe-inspiring relationships are those created by Max Fatchen in *The Spirit Wind* and *Chase through the Night* in which evil men are destroyed by storms seemingly invoked by the old Aboriginals, Nunganee and Narli. In his other novels Fatchen



The dust-jacket from ***The Curse of the Turtle*** *by Thomas Roy is reproduced with the permission of The Bodley Head in Australia and Rex Backhaus-Smith.*

reveals that his understanding of his native land extends beyond the people into the landscape itself with such areas as the River Murray and other areas of South Australia, coming vividly to life.

In the past few years white Australian children's authors have overcome their diffidence and begun to write with confidence from the Aboriginal viewpoint. Foremost among these is Patricia Wrightson whose series of books, beginning with *An Older Kind of Magic* and *The Nargun and the Stars*, uses Aboriginal mythology as a basis for fantasies set mainly in the white world. Later books *The Ice is Coming* and *The Dark Bright water* are set almost entirely in the world of the Aboriginal spirits looking towards the world of the Happy Folk whose relationship with the environment has none of the empathy of the People. No one reading these books can fail to be aware of the antiquity of Australia or fail to ask if the white population can ever be really anything more than visitors however aware of our environment we may claim to be. Children introduced to this mythological world by the picture books of Dick Roughsey and Percy Trezise, *The Rainbow Serpent*, *The Giant Devil Dingo* and *The Quinkins*, will be much more at home with such fantasies than are some older readers who feel that they are intruding. In the same vein as Wrightson's work but both less demanding and less rewarding is Bill Scott's *Boori*, a quest novel set in the Aboriginal spirit world.

CONCLUSION

To draw any specific conclusions from such a wide range of books on such a variety of topics is difficult but one thing is quite obvious. Those books written with the conservation message as the author's main objective are far less successful than those in which the writer's environmental awareness emerges naturally through the characters and plot. It is to be hoped that Australian children's authors continue to show their interest in this area and to convey to their young readers the need to develop a sense of responsibility towards their surroundings whether in the city or the bush.

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DRAMA AND THE ENVIRONMENT

David Taylor
Dennis Gill

PREAMBLE

Roleplaying can place the individual into a situation in which the understandings underlying an environmental education topic can be developed. Through these, values and attitudes may be developed in an unreal setting. Although these values and attitudes will have no currency in real situations, the process of weighing up conflicting evidence before drawing a conclusion can be transferred. Drama can also encourage research and discussion within a roleplaying situation. These are processes basic to the development of aware citizens through environmental education. The first two activities included have been developed in some detail and include notes to the teacher. In the last six activities much of the detail has been omitted and only a brief outline has been included. Many other roleplaying activities could be used. Teachers should also refer to Tony Strutton's videotape 'Imagination and the Environment' which documents roleplaying at the Arbury Park Outdoor School in South Australia. The videotape illustrates a more advanced level of roleplaying.

DRAMA PROJECT 1

'CYCLES AND FOOD CHAINS'

(Devised for Years 5 and 6 by the Bouverie Street Theatre-in-Education team in May 1979)

The Bouverie Street Theatre-in-Education (TIE) team was asked to develop a program for children in Years 5 and 6. In determining the contents of that program, it surveyed the twenty-five classes with whom it would work. Most classes were to study plants in the second or third terms of 1979.

Description

The major purposes of 'Cycles and Food Chains' were to heighten the children's appreciation of the relationship of plants to all living things, to make them aware of the cycles and food chains within nature, and to offer them an insight to the complexities of land use through involvement in a land use planning exercise. These purposes were to be achieved through a series of theatrical and dramatic experiences in which children planned a school camp on a site where there was current conflict between a farmer and an apiarist. The conflict centred on a plant which the apiarist considered was essential to his business but which the farmer wanted removed.

Drama Lesson Plan

Step 1: The class receives a letter (see Figure 41) requesting its assistance in the design of a school camp. Maps and drawings of the piece of land that the camp is to be built on are enclosed.

SPECIMEN LETTER

TIE Team,
17 Bouverie Street,
Carlton. VIC. 3053

Dear Children,

To celebrate the anniversary of the founding of the Specious Services Branch, the Education Department has decided to hold an exhibition of school camp designs submitted by children. Your class is one of twenty that has been invited to submit a model to this exhibition.

Since school camps are used by children and their teachers, we think that you, the children, should have an opportunity to voice your opinions on how a school camp should be designed.

To assist your thinking we have enclosed a map of a piece of land that could have a camp built upon it in the future.

I suggest you think carefully about what you would do with this land. My representative will visit your class on ..... to discuss your ideas with you. It would help greatly if you drew a plan of what you wish to build and also illustrate your ideas before the representative arrives.

I look forward to sharing with you your views and opinions about the type of camp you would build.

Yours sincerely,

JOHN JAMES
School Camp Exhibition

The letter suggests a time and date when a representative of the camp committee or the donor of the land can visit and talk with the children.

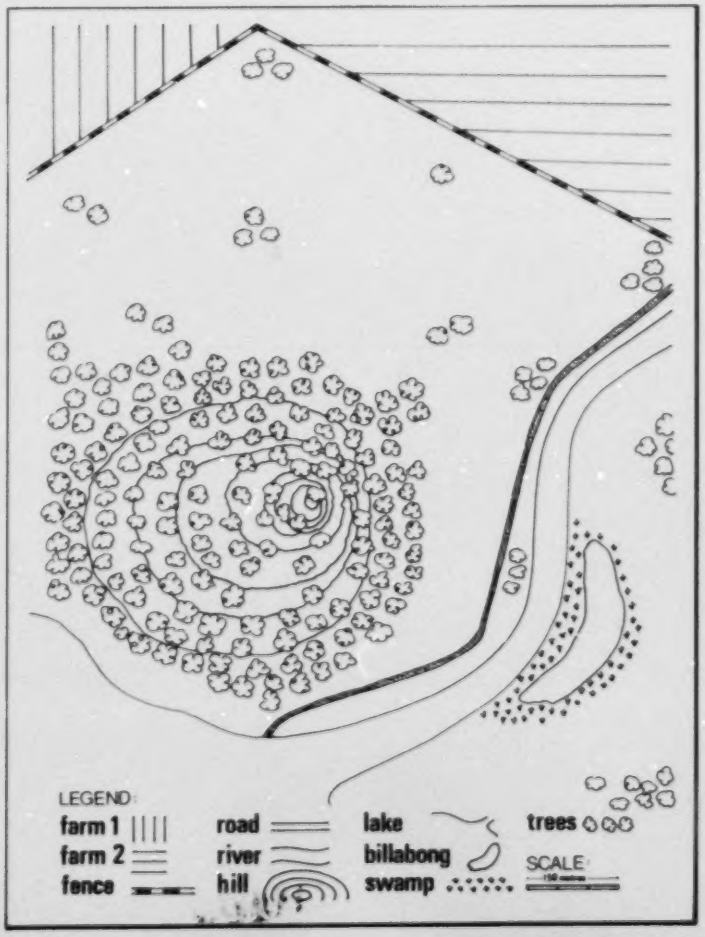
Step 2: The children discuss their ideas. The teacher refrains from giving ideas and allows all ideas to be tabled. Children may wish to draw their ideas onto the map of the site. These are kept as a record.

Step 3: The teacher talks about the children's ideas for the camp and examines their drawings. If possible, these are collated and presented as one camp design.

Step 4: The representative arrives and goes over the design with the children. Before going any further, they need to look at what is actually on the land, that is the mammals, trees, birds and so on, and to take this into consideration.

Step 5: The teacher returns and works with the children to identify what flora and fauna probably exist on this land and discusses with them food chains, seasons and native and introduced species.

Step 6: The children re-examine their designs and discuss the effects these would have on the flora and fauna. The camp is redesigned.



APIARISTS' REASONS FOR STAYING ON THE LAND	CASE FOR THE FARMER
• It is necessary to have Salvation Jane because it provides 60 per cent of summertime honey and without it there is not enough honey-producing flowers for the bees to be on the land. It could be possible to substitute another ground cover flower or bush such as clover or Banksia bush which are also good pollen and nectar producers. • Bees are necessary to ensure that the *Eucalyptus aggragata* (Black Gum) does not become extinct. The bees will pollinate more flowers allowing more seeds to be scattered, thus giving a better chance for seedlings to grow into trees. Trees are becoming extinct because farmers chopped them down to cultivate the land, and ground animals such as rabbits and kangaroos eat the seedlings before they have a chance to grow. • Students who are interested can help with the bees, learn about them and help extract the honey.	• The existence of Patterson's Curse (Salvation Jane) poses a threat to the livelihood of the stock. By eating the flower the cattle in particular can suffer liver damage. • Patterson's Curse is an introduced, noxious weed capable of spreading rapidly. Crops and paddocks used for grazing can easily fall victim to the encroachment of this weed. • Patterson's Curse has been proclaimed a noxious weed by the Agriculture Department of the Victorian State Government. It is therefore regarded as a pest plant and should be regarded as such. It is the duty of anyone concerned with reaping gains from the land to eliminate all such noxious plants. • The most effective means of eradicating Patterson's Curse is by spraying the plant with a solution called 2-4D.

Fig. 42: *Conflicting Demands from Land*

Step 7: An apiarist arrives at the school and informs the class that his bees have been living off a flower, Salvation Jane, which grows over the land set aside for the school camp site. He makes a plea for the Salvation Jane (and thus the bees) to remain (Figure 42). (The apiarist could be the class teacher, introduced by the principal, or another member of the staff.)

Step 8: The children incorporate the bees (Salvation Jane) and Black Gums into their design.

Step 9: The neighbouring farmer arrives at the classroom door. His cattle are dying and he wants the children to pull out this flower, Salvation Jane. If the children don't want to, then he informs them that he will have the land sprayed, because Salvation Jane is really Patterson's Curse, a noxious weed (Figure 42).

Step 10: The children must find a way of removing the plant. At the same time, they need to provide an alternative pollen source for the bees.

Step 11: The class should collect all its research material, build its final model and display its work for all to see.

Step 12: The teacher should guide the children in a reflection process in which they trace the ways their original ideas evolved to the final product.

Comments

- Before you start this type of work tell the children they will be involved with, and in, a drama. Explain to them that the problems that arise must be faced as if they were real, even though they know they are not. Ask them to willingly suspend their disbelief.
- Set up a signal with the class, for example, calling a camp design meeting, that tells them they are back in the drama.
- Steps 1 to 12 are not confined by a single time unit. Each step may take several days or weeks to complete, or it may take minutes.
- Depending on the knowledge of particular classes, some steps can be skipped. Similarly, some extra steps may need to be added. This can only be determined by closely monitoring what the children say and do.
- Assist them to find what bodies or departments would be brought into play if this was a real problem.

DRAMA PROJECT 2

'CRISIS IN A VILLAGE'

(For Years 4-9)

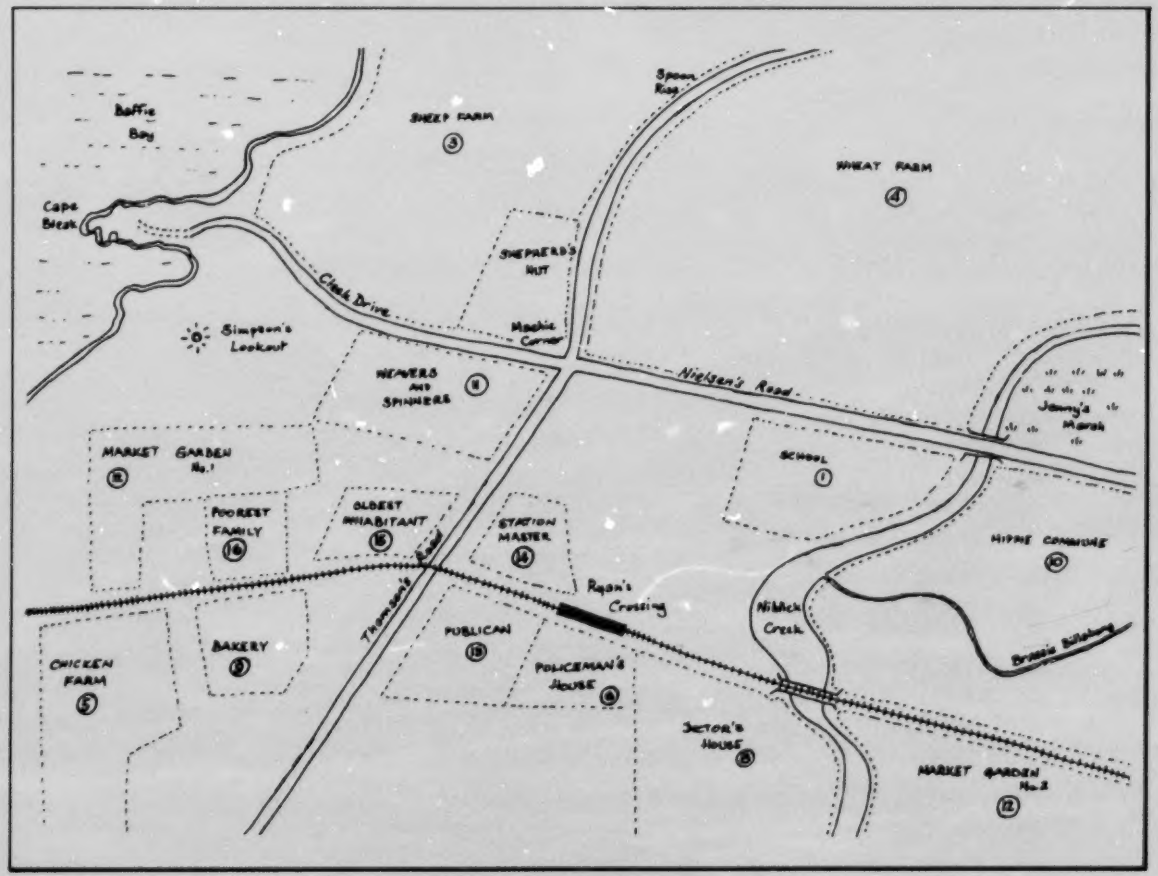
Description

A well run village community is presented with the problem of what to do with the sudden imposition of a high density housing estate and a shopping complex on its land. This creates a crisis.

The children are introduced to their community via a 'map' approximately 4m by 3m on to which they draw major details such as roads, rivers, farms and houses. The finished product may look something like Figure 43. Details of the owner of each property, particularly occupation and character, should be placed on role cards and mounted in the appropriate position on the map. Some cards will involve two or more children working together as brothers, sisters, a family and so on. Examples or cards are attached.

The aims of 'Crisis in a Village' are:

- to bring children face to face with the concept of environment and to extend that concept to include consideration of the human environment
- to introduce children to problems associated with the disturbance of the environmental balance
- to encourage children to research environmental issues in order to arrive at their own solutions
- to give children a chance to explore, confront, experiment with and take sides on the issues raised in a committed fashion as part of an evolving and involving situation.



PLANS OF LESSONS

Step 1: Lay the map out on classroom floor. Place numbers of texta colours and coloured pencils at intervals around the map. Place numbered character cards on corresponding numbered divisions on the map.

Step 2: Have the children enter the classroom and seat them around the circumference of the map. Address the children along the following lines:

'You are the citizens of . . . . . (name of town). As you know, I am the Mayor. Although we are quite a small community, only three years old, situated not very far from the heavy industrial town of . . . . . (name) to the (north/south etc.), I am hoping to make our little town a fine and healthy place to live. I seek your help.'

When the children have given their assent, proceed to Step 3.

Step 3: Having removed shoes, children should walk over and around the map, looking at the various character cards until they have chosen one that they like. They should remember that some cards will involve two or three children working together.

Having chosen their card, they should then take what coloured pencils or textas they need back to their 'property' marked out on the map. On to it they should then draw whatever features they think are necessary. Thus a farmer might add animals and buildings, trees, billabong; a school teacher might add a school house, playground equipment, vegetable patch, teacher's house, and so forth.

While they are doing this they should also be thinking more about their character, what sort of person each is, their likes, dislikes etc.

Step 4: When this process is well underway, encourage the children to start to talk (in character) to their neighbour to introduce themselves, while still working, to find out about their neighbours, and to tell their neighbour about themselves.

COMMENTS ON LESSON PLAN

Step 1: Ensure that the map is drawn in a clear and uncluttered way, with properties clearly numbered and marked out on paper that will withstand children crawling all over it.

Step 2: By assuming the role of Mayor, several things will ensue.

- In order for the drama to proceed (we will assume that childen will want to do it) the children must take on the roles of townspeople. Thus the scale of authority is established.
- This will mean that in order to further the drama the children will have to play out the drama through the teacher who is then in a position to:
  * control the pace and direction of the drama
  * use his/her role and office (of Mayor) as a means of discipline
  * challenge any assumptions, destructive attitudes or facile conclusions that the children may make
  * extend the thinking and responses of the children.
- Thus the teacher is able to control the progress of the drama from within, taking up some issues of children and letting others go.

Steps 3 and 4: The purpose of Step 3 (and Step 4) is to increase the children's commitment by deepening their involvement initially with their own role and later with that of their classmates.

If some children finish early they might like to go for a 'walk' to visit some of their distant neighbours. AS THIS ACTIVITY MAY WELL GO FOR SOME TIME, THE CLASS TEACHER MAY LIKE TO FINISH HERE AND CONTINUE NEXT TIME. IF NOT, THE TEACHER SHOULD PROCEED TO. . .

Step 5: When the greater number of the children are at the point of finishing, announce that there will be a town meeting shortly to which all must attend. While the class is finishing the teacher prepares a meeting area.

The use of a meeting as a means for the children to describe and discuss what they have been doing, may allow the following things to happen:

- A kind of minor deroling takes place, ensuring that any built up tension or excitement which may have occurred is slowed down before the children become overexcited and, as a class, directionless.
- This discussion situation fosters the commitment of the children because they will now tell others what they have done. This makes the situation and their role more real to them.
- The discussion situation also allows children to reflect, in role, on what they have done and will do. Thus, they can better plan for the future.
- The teacher is given the chance to question and challenge the children, to provoke their thoughts and suggest future courses of action.

Step 6: Call the meeting to order. Announce with great pride and pleasure that . . . . . (name of town) has received the Town Of The Year Award. This is for overall appearance of the town and the way in which harmony has been maintained between the town and the natural setting. Call on the various members of the town to make a small report describing the previous year, how it has gone, what problems there have been, etc. (These citizens may need to be forewarned that they will be asked to make a report.)

Steps 6 and 7: By immediately assuming the role of Mayor, the teacher will carry the children along and help them to capture the mood of the meeting. One or two significant props such as a mayoral chain, a briefcase or an umbrella will help assist the teacher to assume the role of Mayor.

Step 7: On a pre-arranged signal and as reports are finishing, have a government representative of the Ministry of Labour and Housing knock and enter. (The representative could be another member of staff, or co-operative parent.)

Step 8: The government representative in a brief speech should make mention of the following points:

- He is just passing through, with little time to spare, and is taking the opportunity to inform the town personally of what will come by letter soon.

Step 8: At all times the government representative should be polite, cool, efficient, cagey, bureaucratic.

- The Ministry of Labour and Housing, in order to accommodate the number of workers required for the growing industrial town of .....(name), ...(kms) to the .....(north/east etc.) has decided to erect a high density housing estate in the town. Together with this, there will be a shopping complex.
- This will provide work for the townspeople. It will also provide extra income in terms of goods and services required.
- Should any industrial workers lose their jobs, or if wives and school-leavers among their children be looking for work, government money will be available to expand some of the farming and cottage industry aspects of the community.
- Because the town was clearly very proud of its appearance, the Ministry has decided that the townspeople should determine the location of the housing estate and shopping complex.

Step 9: After the departure of the government representative, the Mayor leads the townspeople to discuss the implications of the proposed development by examining topics such as:

- the overall acceptability of the project
- what can be done if the town rejects the project
- the effect of the project on the townspeople and their lives
- the effect of the project on the environment
- where to site the high density housing and the shopping complex
- the possible competing interests of those whose farms or business may benefit by the proposal compared with those who object to the upsetting of the life of the town and the disturbance of the environment
- the provision of extra community facilities.

The teacher may well be able to use locally relevant issues.

POSSIBLE END OF SECOND LESSON

Step 10: The townspeople split into groups to plan the project, discuss, assess and research the environment issues, or come up with compromise solutions for the competing groups (this section might consist of one group with all relevant representatives or two or more groups each containing representatives of a sectional interest).

This step may take a number of days or lessons to complete.

Steps 9 and 10: This part of the drama, when the children go off to explore, gather information, interview people, etc., may extend over days or weeks.

A simple means of getting the children back into role whenever the drama starts again, is to call a brief planning meeting and before the meeting starts, mingle with the townspeople, in role, asking questions about their farms, families etc. It may be expedient, in order that the drama does not lose momentum, for the teacher in the role of Mayor to supply information rather than have the children go off to books.

Step 11: The government representative 'blows in' (just passing though) to answer any questions and to put people's minds at ease.

Step 12: The final meeting may be concerned with presenting information before looking at, discussing and voting on suggested solutions.

Step 11: You may find that the children will suggest where to go from here.

THE CHARACTER CARDS

Note: These are suggestions only. The teacher or children may develop their own interpretations.

CARD 1

SCHOOL TEACHER: Knows all the children and parents of the town. Kind but firm. Speaks his/her mind when it is felt necessary.

CARD 2

MARKET GARDENER: Always friendly. Comes up with crazy ideas.

CARD 3

FARMER AND SON: Sheep farmers. Father is mean and nasty, son is generous and kind.

CARD 4

FARMER: The biggest landowner in the district. Dresses well and eats well. Expects to be listened to. Grows wheat.

CARD 5

CHICKEN FARMER, SON AND DAUGHTER: *Her* husband died last year. She never stops talking. The *son* has even crazier ideas than the market gardener. He is fourteen. The *daughter* is twelve and wants to be a pop star.

CARD 6

THE VILLAGE POLICEMAN: About fifty, strong.

CARD 7

SHEPHERD: Quiet, shy, will only talk if there is something important to say.

CARD 8

DOCTOR: Is rich and wants to get richer.

CARD 9

BAKER: Is a friend of the wheat farmer.

CARD 10

TWO HIPPIES: From the local commune.

CARD 11

A FAMILY OF WEAVERS AND SPINNERS: Two parents, two children (sixteen and eighteen). They are gentle people who want to protect their village.

CARD 12

A MARKET GARDENING FAMILY: Grandpa/or ma, parents, two children (thirteen and fifteen). They are suspicious of everyone, cranky, and always fighting among themselves and with others.

CARD 13

PUBLICAN: Owns the local hotel, always speaks his mind.

CARD 14

OLDEST INHABITANT: She is about eighty and very wise. People always listen to her. She has a small, pretty house.

CARD 15

POOREST FAMILY: Parents and two children (ten and thirteen). Their house is not much more than a two-roomed hut. They grow a few vegetables and get by by doing odd jobs for the other people in the town. Ma is very strict, Pa likes to tell jokes, the children don't go to school very often.

This represents characters for a class of thirty children. More can be added. They have been deliberately chosen to provide a balance of character types. The personalities suggested are stereotyped. Teachers or students can make up their own or modify the existing ones. However care will be needed if the character cards include personalities. Further ideas on characterisation can be found in the environmental simulation *Walmit Divided* which is published separately by the Curriculum Development Centre.

A SELECTION OF SHORTER DRAMA ACTIVITIES

The following activities are designed for the teacher who does not wish to engage in an extended drama activity lasting a number of sessions, but wishes to use drama in an occasional manner in a program of environmental education. Some of the activities could be extended along lines similar to the projects which have been outlined previously.

Trailing

The Gould League has produced a publication detailing a variety of trails, both rural and urban, on which children can be taken. After a trail

- the children re-create an environment out of one of their trails
- the children reproduce in sound and movement the essence of various trails such as the shapes in a city block or the natural flowing moves of a field by a river, or other children can either view it, or be given the experience of the trail without leaving the room
- make an environment that, at various points, corresponds directly to the trail in sound, colour, texture and smell.

The Vacant Block

Have the children visit a vacant block or unused piece of land. Let them consider it in terms of its location, relation to the environment, beauty or ugliness, financial value, suitability for various purposes, and so on. After the visit the children:

- act out the history of that vacant block, showing how things get there. Use a drum to indicate the passage of time.
- set up a local council meeting to discuss the future of the block. Establish various groups such as the residents' action group, a building developer, and McDonald's franchise holder, or Parents for Playgrounds, whose job it is to research and then present submissions to the council arguing why they should be allowed to develop the land. Then set up a joint meeting where the various parties can negotiate their claims.

Flowers

Have the children study a flower, a dandelion for example. Afterwards, groups of children become the dandelion, its roots, its stem, leaves, flower.

Creative movement can be used to show:

- its normal breathing cycle, its feeding cycle
- the effect of the seasons
- the reproductive cycle
- the effect of sun and rain on flowers
- how it entices insects
- how it protects itself from being uprooted or eaten

Special attention should be paid to the children achieving the correct shape of the leaves, the fruit, the hooks for grappling. Perhaps two or three students could be chosen to be the director of the plant, controlling, through an intercom, the whole movement of the plant.

Running a City

Set up a management board for a small town with individuals responsible for water supply, sewage disposal, transport—public and private—food processing and distribution, garbage

disposal, and housing. It is the job of each group to find out the range and nature of their duties and where there might be conflict with other instrumentalities. Arrange a meeting to discuss how best this process can be integrated and made to function harmoniously.

Poilution

Make a pollution machine which makes noise, ugliness, bad smells, dirty air and kills plants. Then make one which does the opposite.

Animals

Groups of children choose to be an animal and act out some part of that animal's existence that is really important—for example hunting for food, avoiding predators, finding a mate, or resting.

The class then suggests a change in that animal's environment and acts out the animal's life in response to the environmental change.

WALMIT DIVIDED

J. Walker and J. Mitchell
Canberra College of Advanced Education

Walmit Divided is a curriculum offering that is based on a very simple idea. In essence it is a simulation program involving the creation of a hypothetical township located somewhere in Australia. The settlement is intended to embody the main characteristics of any small town with a population of around three thousand to five thousand souls.

The materials consist of:

- scale maps of Walmit
- basic profiles of sixty-five (or 130 if both the male and female roles on each profile card are used) inhabitants whose only common element is an active interest in community affairs
- a set of seven scenarios which suggest situations where disagreements and tension may arise in the township

In our view, ideas are more important than the printed materials of a curriculum and therefore the Walmit materials are minimal. Furthermore it is our persuasion that professional teachers can better realise what they see as the possibilities of an idea if they are unconstrained by notions of the designer's intentions. To put it another way, we believe teachers using *Walmit Divided* will benefit more by talking to other teachers than by reading a Walmit Manual. For example, during trials of the materials some teachers discarded most of our scenarios and translated local controversies into the Walmit situation. This seemed to us to be spendid.

As proof of our conviction that manuals for this type of curriculum can be cumbersome, a non-guide to Walmit is available. It will be of little assistance in terms of directions, although we think it does raise some issues.

Walmit Divided promotes those values decided by the teacher and/or the children and as such can be used to develop an environmental ethic, or a racial ethic. . . It could also be used to discover some of the prevailing ethics of the classroom!

It has been used successfully with Year 6 children in country towns in New South Wales and with inner urban children in Adelaide. With a minimum of modification it can be used with older children.

Walmit Divided has been published separately by CDC and is available from: Curriculum Development Centre, P.O. Box 52, Dickson, A.C.T. 2602.

IMAGINATION AND ENVIRONMENT

Tony Strutton

This is a twenty-one-minute colour videotape presentation entitled *Going outside, to imagine, to play, to learn* which explores teaching approaches contained in each of four outdoor adventures with children from Year 2 to Year 7. The accompanying booklet emphasises the teaching points, suggesting ways they might be adapted to other outdoor situations. The video and booklet are available from the Curriculum Development Centre, P.O. Box 52, Dickson A.C.T. 2602. Please write for details.

In the videotape, theatre techniques long associated with conventional indoor proscenium play performance are combined with a variety of outdoor learning environments to create different student programs and teaching approaches which span many subject areas at primary school level. The videotape contains three 'trails' and an environmental conflict simulation with captions to highlight issues and teaching points. All the activities represented encourage students to find an empathy with the natural environment by sharing feelings as well as thoughts in a variety of subject areas.

TRAILS

These are journeys in which students *discover* a variety of predetermined *inputs* on the way. Elements of mystery and surprise are essential ingredients in the examples below:

The Appy Arbury Trail (Junior Primary): A fictitious forest recluse called Appy Arbury leaves secret messages on a tape recorder which lead children on a journey where they discover mystery parcels. At each point Appy speaks to them on tape and the teacher develops the material.

Un-natural Trail (Primary): We enter the 'Silent Forest' in which we spot a number of synthetic objects which don't belong.

The Bush Creatures Trail (Mid-Upper Primary): A story comes to life and we find out what it is like to be bush creatures with certain skills. In the first chapter, we collect building materials without hands. We communicate without words. In the next we cup our ears and we move as kangaroos or wombats, living the environment from their perspective. In another, a secret bush creature initiation ceremony leads to mud-painting.

ACTIVITIES IN ONE PLACE

Example: *Environmental Conflict Simulation* (Upper Primary): This activity is introduced as a game to students. We travel to a specified piece of land which is to be developed in a particular way. Sir Reginald Watson M.P., Independent, meets the group and explains what representations have been made from certain groups with conflicting interests. Students join these different groups to present their case to Sir Reginald one hour later. A secret ballot and debriefing session follows.

SECTION 3

OUTDOORS

INTRODUCTION

The outdoors begin at the classroom door! This is the message of the following items which identify activities that can be done in the schoolgrounds or nearby urban areas. Some focus on the natural environment and the others on the man-made environment. All encourage teachers to take an integrated approach to the outdoors.

The Pilot Environmental Education Project was developed as part of an in-service workshop kit by the Queensland Education Department to assist teachers to make better use of outdoor areas such as field study centres, national parks, local parks, bushland allotments and particularly, schoolgrounds. Field study centres have been established in each region of the State in Queensland and the operation of one of those centres, the Fortitude Valley Field Study Centre, located in the heart of Brisbane, is described in an attempt to illustrate the relevance and ease of using the city and its streets for aspects of an environmental education program.

Another Primary Environmental Education Project was developed at Kuring-gai College of Advanced Education in New South Wales by teachers attending two in-service programs in 1977. The two units reproduced here illustrate the use of a natural area in an urban location ('Davidson Park') and an arterial roadway through a suburb ('The Highway').

Other materials on the use of the schoolgrounds (*Exploring Outdoors*) and the local streets (*Streets*) are published separately by the Curriculum Development Centre.

Most educators who use the outdoors as a medium for environmental education are enthusiastic about its impact on the cognitive and the affective learning of the children. Clearly the outdoors can motivate children as well as stimulate more open-ended thinking. But it is not an easy medium to use. It requires thorough preparation to ensure the experience is an effective one, for a focus is much harder to maintain when the diversity of things to see or hear or smell or do, is suddenly expanded. That doesn't mean that organisation needs to be rigid or even obvious to the children. Spontaneity is clearly one of the joys of being outdoors. It does mean, however, that the teacher needs to anticipate the problems of safety of the children and of the environment to be explored, and as well, the disruptions to the internal workings of the school.

PILOT ENVIRONMENTAL EDUCATION PROJECT

R. Stevenson
Curriculum Branch, Education Department, Queensland

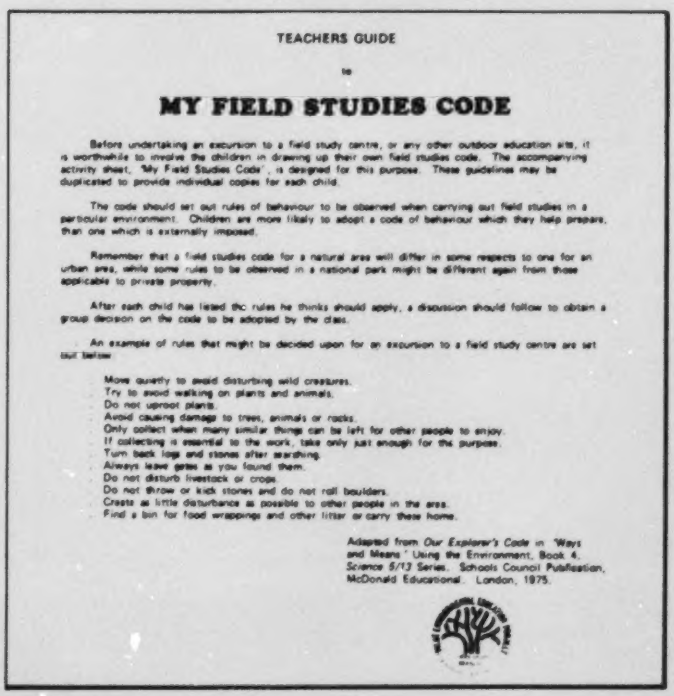
BACKGROUND

There has been an increasing recognition among teachers of the educational value of using the out-of-doors as a part of their teaching programs. Despite this, many teachers are often reluctant to take their students outside the classroom and involve them in field studies. Teachers seldom even use the immediate school area, which is an important environment readily available for study. This reluctance seems to stem from three main factors which teachers, especially in primary schools, perceive as limiting their capability to conduct successful field studies:

- Lack of knowledge of what field study areas have to offer.
- Lack of understanding of the kinds of field activities that might be undertaken with students.
- Lack of confidence in their own skills in the techniques of field studies and field teaching.

To increase the opportunities available for children to gain field experiences, several interested organisations, individual citizens and government departments in Queensland have set aside specific field study areas. The mere provision of such areas, however, has not been sufficient to encourage many teachers to include field study activities in their educational programs. Recognising the fact that the value of field study areas needs to be demonstrated, the Queensland Department of Education has adopted a policy of setting up a network of field study centres throughout the State. A major purpose of these centres is to show how teachers can use a local environment and its resources to help students achieve the aims of environmental education. A visit to these centres therefore gives teachers who lack the necessary confidence and expertise the opportunity to observe how field activities may be structured in a variety of environments, while participating with students in the learning experiences. On subsequent visits to a centre, teachers are expected to accept an increasing responsibility for the conduct of their students' field study program. Thus, as teachers develop their own confidence and expertise, field study centres could be expected to place a greater emphasis on functioning as resource centres on environmental education for their local region.

To enable teachers to develop their confidence and expertise with their own students over an extended period of time the following sample activities were developed.



TEACHERS GUIDE

to

MY FIELD STUDIES CODE

Before undertaking an excursion to a field study centre, or any other outdoor education site, it is worthwhile to involve the children in drawing up their own field studies code. The accompanying activity sheet, 'My Field Studies Code', is designed for this purpose. These guidelines may be duplicated to provide individual copies for each child.

The code should set out rules of behaviour to be observed when carrying out field studies in a particular environment. Children are more likely to adopt a code of behaviour which they help prepare, than one which is externally imposed.

Remember that a field studies code for a natural area will differ in some respects to one for an urban area, while some rules to be observed in a national park might be different again from those applicable to private property.

After each child has listed the rules he thinks should apply, a discussion should follow to obtain a group decision on the code to be adopted by the class.

An example of rules that might be decided upon for an excursion to a field study centre are set out below.

Move quietly to avoid disturbing wild creatures.
Try to avoid walking on plants and animals.
Do not uproot plants.
Avoid causing damage to trees, animals or rocks.
Only collect when many similar things can be left for other people to enjoy.
If collecting is essential to the work, take only just enough for the purpose.
Turn back logs and stones after searching.
Always leave gates as you found them.
Do not disturb livestock or crops.
Do not throw or kick stones and do not roll boulders.
Create as little disturbance as possible to other people in the area.
Find a bin for food wrappings and other litter or carry these home.

Adapted from *Our Explorer's Code* in 'Ways and Means' Using the Environment, Book 4, *Science 5/13* Series. Schools Council Publication, McDonald Educational. London, 1975.

TEACHERS GUIDE

to

OUR ENVIRONMENT

AIMS The main aims of this activity are to:

- increase the observational skills of children in the out-of-doors, and
- create a greater awareness in children of the variety of conditions that make up their environment.

Before commencing the activity? Discuss the meaning of the word 'environment.'

Definition: *Environment is the sum of all external conditions and influences affecting the life of living things.* (Encyclopaedia of Science and Technology).

What this definition really means can best be conveyed by discussing examples of the environments of various people and animals. For example, the environment of a child in the classroom consists not only of the physical properties of the room (walls, desks, blackboard, posters etc.) but also of the atmosphere created in the class by his fellow pupils and his teacher.

Discuss the 'environments' of: miners at work, sailors at sea, earthworms in the soil, penguins at the South Pole.

Where? May be carried out in any environment – school grounds, local shopping centre, nearby creek, vacant lot, etc.

This activity would be most beneficial for comparative purposes if undertaken in two different environments:

(a) man-made environment (e.g. local shopping centre)

(b) natural or near-natural environment (e.g. nature area in school grounds, local creek).

CAUTION Remember that many of the pairs of words listed represent value judgements. These may not correspond with yours, so take care not to 'correct' the judgements of your children by imposing your value judgements.

How? Allow pupils to work either individually or in small groups.

At the end? Invite your pupils to talk about their responses. Try some of the suggested extensions.

1. Have your pupils describe in words, or sketch, objects that they listed by using *touch* or *smell*.
2. Use photography and tape recorders to record objects your pupils have listed by using their *seeing* and *hearing* senses.
3. Group pupils in pairs and, in turn, blindfold one member of each pair. Have the unblindfolded student lead his or her partner to see if they can identify various objects that they touch, smell and hear.

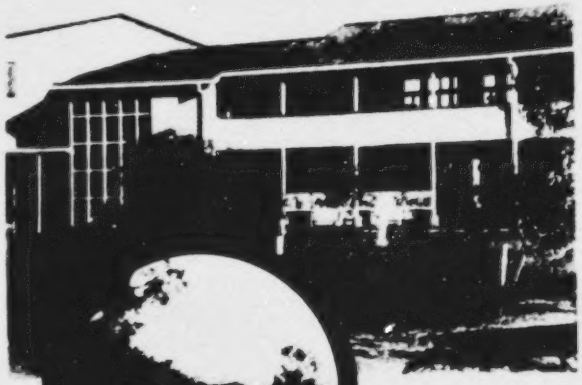
Encourage pupils in these activities to:

feel the soil and the grass

smell the flowers or wet grass

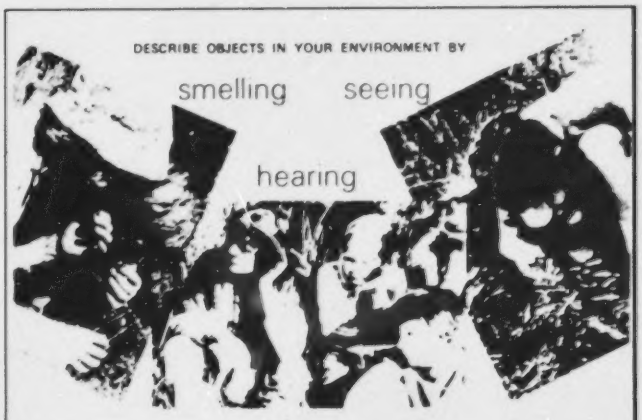
listen to the birds and cicadas.

Draw up a sense clue chart by listing the senses of sight, hearing, touch and smell across the top of a sheet as major headings. Working individually, children simply list all that they see, hear, touch and smell.



Our environment

YOUR ENVIRONMENT IS ALL AROUND YOU!



* Go outside and find objects in your environment that fit the following pairs of words:

tall/short
big/small
hard/soft
ugly/beautiful
many/few
thick/thin
together/alone
rough/smooth
wet/dry
bright/dull

warm/cool
light/dark
strong/weak
quick/slow
young/old

Here are some more:

important/unimportant
loud/soft
useful/wasteful
pleasant/unpleasant
open/closed

touching

* *Now you might like to make your own pairs of words. Find objects to fit these words.*

[redacted]

TEACHERS GUIDE

BE AN ENVIRONMENTALIST

AIMS

The main aim of this activity is to:

increase the observational skills of children in the out-of-doors
but at the same time to
create an awareness of the many components (e.g. plants, animals, soil, rocks, water, the sun, etc.) that play a vital role in any natural environment, and
introduce the concept of interrelationships among these components.

Before commencing the activity?

Discuss with your pupils some of the living components (*plants* — trees, grass, moss, etc., *animals* — wallabies, birds, insects, etc.) and non-living components (soil, rocks, water) that you might expect to find in a natural environment, such as the one illustrated in the enclosed photograph. You may wish to use this photograph to help stimulate discussion.

[redacted]

Where?

May be carried out in any natural or near-natural environment such as the school grounds, local reserve, nearby creek, vacant lot, etc.

How?

Allow pupils to work either *individually* or in pairs. You may wish to have only part of the class outside at any one time.

Points to Emphasise?

Emphasise to your pupils that:

1. Examples are NOT to be COLLECTED, but *listed* or *sketched* on paper or, *alternatively, photographed*.
2. The activity is not a race to see who can find examples of the ten descriptions first, but rather to find and discuss the *most appropriate* examples.

At the end?

Arrange a discussion of pupils' responses, either in small groups or as a class. Perhaps a list could be produced of the most appropriate examples of each description. These examples could be derived by your pupils, each discussing and defending his own examples. For example, for description 8 on the pupil worksheet:

8. Something that can't be touched —

First child: "*The top of a tree.*"

Second child: "*You can touch it by climbing up it. I've got clouds — you can't touch them.*"

Third child: "*Yes, you can if you go up in a balloon, but no one can touch the sun.*"

[redacted]

The aim of this exercise is to develop children's awareness of the interdependence of living and non-living components of a natural environment. Arrows should be used to connect components that *depend* on other components for survival.

Library work may be necessary for your pupils to complete the drawing of arrows showing interrelationships.

Some references that may be helpful are:

BILLINGTON, E.T. *Understanding Ecology*. Kaye and Ward, London, 1971.

BRANDWEIN, P.F. et. al. *Concepts in Science*. Teacher's edition (Brown) Harcourt, Brace, Jovanovich Inc. 3rd edition 1972.

EDWARDS, C. & KILPATRICK, C. (eds.) *Exploring Ecology*. McDonald & Co., London, 1974.

EDWARDS, C. & KILPATRICK, C. (eds.) *Looking at Living*. McDonald & Co., London, 1974.

FARB, P. *Ecology*. Time-Life International, 1965.

be an

ENVIRONMENTALIST

When you go exploring.....

LOOK CLOSELY for

BIG things and SMALL things.

- Two environmentalists visited your school recently and wrote down descriptions of what they found.

Can you *be an environmentalist* and SPOT examples of what they might have found.

You may EXPLORE CLOSELY, but:

- *Don't collect anything.*
- *Replace anything you move.*

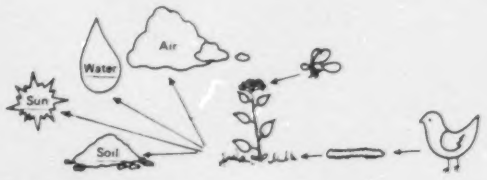
Here are their descriptions:

1. A living thing that is growing.
2. Something that was once alive.
3. Something that breaks into many parts.
4. Something living on something else.
5. Something that has changed into something else.
6. Something that is impossible to count.
7. Something that can't be photographed.
8. Something that can't be touched.
9. An object that is useless in nature.
10. A natural object that could be used as a tool.

- Now draw ONE picture to include ALL the things you listed. Include yourself in the drawing if you like.

Add arrows to your drawing to show things that depend on other things. For example:

grasshopper → grass; tree ← sun, air



This is one person's drawing.

My Field Studies Code

Many people will wish to visit this area after you. You must be careful to have as little effect on the area as possible.

Can you think of a set of rules that you would like your class to follow so that you, and they, will enjoy this and other visits?

One important rule is already written to help you make a start. Now keep going.

1. Noisy frightens animals – *speak and move quietly.*
2. _____
   _____
3. _____
   _____
4. _____
   _____
5. _____
   _____
6. _____
   _____
7. _____
   _____
8. _____
   _____
9. _____
   _____

What sort of rule did you write about collecting specimens?

oooooooooooooooooo

Let no one say
and say it
to your shame
that all
was beauty here
before you came

oooooooooooooooooo

Talk about the reasons for your 'rules'. Discuss them with your friends and teacher.

PRIMARY ENVIRONMENTAL EDUCATION PROJECT

K. Morgan
Kuring-gai College of Advanced Education, New South Wales

PREAMBLE

The Primary Environmental Education Project was developed at Kuring-gai College of Advanced Education by teachers attending two in-service programs in 1977. In all, seven units were produced in the series. Two of the units, 'The Highway' and 'Davidson Park' are reproduced.

Like the Pilot Environmental Education Project developed by the Queensland Education Department, the Kuring-gai Project was developed by teachers using the natural environment. The activities produced are designed to be used in natural or near natural areas within both urban and non-urban environments.

The unit 'Highway' is a unit of inquiry integrating science, social studies, language, mathematics and visual arts. It can be easily adapted to be used on any grade and on a nearby road. The unit 'Davidson Park' involves children in the study of an urban natural park and the conflict between the maintenance of the bush and the pressures associated with its use and abuse by people.

Preamble

This is a unit of enquiry integrating Science, Social Studies, Language, Mathematics and Visual Arts. However, teachers may see the possibility of using the activities to lead to other curriculum areas.

The unit was trialled using the Pacific Highway, but is not in any way prescriptive and could easily be adapted to be used on any grade and on a nearby road, street or lane.

The unit is organised around five main environmental concerns which are interrelated.

Each environmental concern has been posed as a question to encourage enquiry.

Treatment of each question may begin with acclimatization activities — to motivate the children and develop their environmental awareness. Learning experiences will follow and are linked to the objectives to ensure purpose and direction. Suggested acclimatization activities are presented at the beginning of the unit.

It is expected that spontaneous activities will arise as each concern is examined.

Teachers may wish to organise their own unit selecting some activities from one or any of the various environmental concerns, according to the age, needs, interests and abilities of the children.

Evaluation should be ongoing to determine further activities based on children's growing understandings and interest.

Evaluation should always be related to objectives. Some methods of evaluation may be:

- observation of children working and of children's work;
- pencil and paper;
- discussion with children;
- pupil's self-evaluation;
- skills competence.

Environmental concerns

Objectives

To provide opportunities for children to enquire into and develop an awareness and concern for the following environmental issues —

- How much of the natural environment near the highway remains?
- How does the highway cause pollution?
- How does the highway affect the way people use space?
- Why is the highway where it is? How has the highway changed and why?
- What resources and energy are used in association with the highway? Where do they come from?

To enable children to react to the sensory experiences related to the highway.

To develop skills, and acquire knowledge necessary for the formation and development of the concepts and values implicit in the unit.

To develop the social skills necessary to work in group situations, and to share and accept findings and ideas.

To provide opportunities for children to gather, organise and communicate information.

To encourage children to use the information and awareness gained to infer, predict, hypothesise and generalise.

To encourage and provide opportunities for children to take action as a result of their investigations and concerns.

Concepts

Conservation, interdependance, human and natural welfare, conflict (people with the environment), energy usage, change, pollution, economy of space and natural resources, landuse, causality, spatial relationships, mobility and sensory communication.

Skills

To gather information from a variety of sources, such as observation, surveys, measurement, interviews e.g. local people, guest speakers, research, documented and undocumented data.

To organise this information by collating, labelling, graphing, making retrieval charts, flow charts, environmental boards, and models.

Further, to communicate findings through associated language arts, all forms of audio-visual media, simulation games and role playing.

Values and attitudes

Valuing of the natural environment.

Responsibility towards people and the environment.

Conservation of the natural and man-made environment.

Considering the alternatives of existing and predicted patterns and the consequences of these.

Acclimatization activities

Scrutinizing small things.
Select an object to hold in your hand. Examine it minutely. Really get to know it. Use all your senses. Pick a natural setting. Sit down and scrutinize your place thoroughly as you did with the object. All places are different. Nothing is really like anything else. Every thing and place has fresh qualities. Discover something unique about your place. Change your angle. Turn around and around. Crawl in widening circles. How would it appear to an ant, giant, or a leprechaun?

Seeing the sky
Look up. How would you describe the sky? Work at being precise in your visual account. What is its colour?

Feel the sky. Its colour, texture, smell, taste. Is it heavy, smoky, murky? How does it make you feel?

Look at something nearby. What was it like yesterday? What will happen to it tomorrow?

Dog feelings
Tape thumbs to hand to simulate a dog or cat paw affect.

Feel things as a cat or dog would feel.

Do the same with smelling.

Communicate with each other as a dog or cat would.

Spider web
Make a large horizontal spider web of string. Blind-folded person stands through centre hole and endeavours to locate the "prey" by feeling the strands.

No branch space
Lie on your back looking up at a tree. Explore this tree. Examine its trunk, branches and foliage. Gaze along a branch.

Look carefully at a special part of a tree. Look at the spaces around and behind the tree, between its branches.

What is the shape of "no branch space"?

Deaf trail.
Use ear plugs (cotton wool) to mask the sense of hearing. Make a leaf trail. Note all you saw and felt.

Hand shaking experience
Shake hands firmly with a friend. Tell each other what feeling you get. Go and find a tree and shake hands with its leaves. Try to find a leaf that gives you the same feeling as our friend's handshake. Get your friend to shake hands with the leaf and share the feeling with your friend.

Touching a tree
Find a tree. Caress then massage its trunk. Try with a different type of tree. Use your nose, tongue and other parts of your body. This action places your whole body in contact with the object and provides a good example of multi-sensory way of comparing things. Think — how does the object feel that is being touched by me?

Kangaroo ears
Put your hands to your ears to make kangaroo ears.

What do you hear?

Take your hands away, what do you hear?

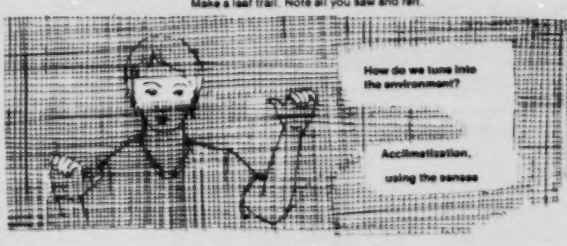
Make kangaroo ears again. What have you found out?

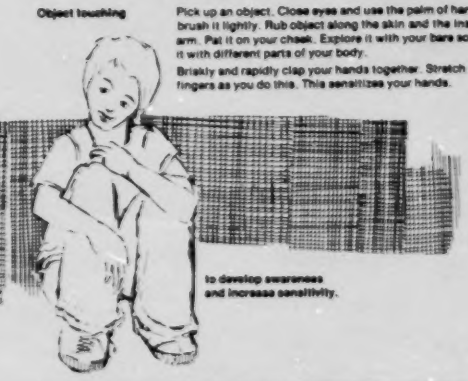
Smell track
Breathe deeply. Expand your nostrils. Suck the air up into the top of your nose. Try to find different and main odours. Try to follow a smell. Hold things to your nose so you can pull the air in through them. Moisten things before smelling them. Crumble or crush in your hand. Rub plant juices on your body. How does a field smell? A sunset? How do you smell?

Season watching
Play "Season watching". Place children in separated spots where they freeze and let the natural or urban world "sweep over them".

Object touching
Pick up an object. Close eyes and use the palm of hand to brush it lightly. Rub object along the skin and the inside of the arm. Pat it on your cheek. Explore it with your bare sole. Touch it with different parts of your body.

Briskly and rapidly clap your hands together. Stretch your fingers as you do this. This sensitizes your hands.





How much of the natural environment remains?

Brainstorm

Record on overhead projector or chalkboard the children's immediate reactions to the word "highway". Discussion of impressions, to lead to the generalisation that the highway looks to be a man-dominated environment.

Pose the question: How much natural environment remains?

Are there any animals, plants, natural colours, soil, water, living happily along the highway? Depending on the section of highway, the investigation of how much is left, will follow.

Finding out

Out on the highway.

Children use activity sheets, magnifying glasses, etc. to assist their closer observation of natural life continuing to exist along a largely concrete and bitumen environment.

ACTIVITIES

Ant tracking — animals
Find an ant and follow it. Mark its trail with chalk. Note where it goes. Is one place visited frequently? Why?

Plants in pavement cracks
Where do you find these plants? Feel and smell the plants. Make friends with a plant, your own special plant and give it a name.

Write a poem or story about your plant.

How many different types of plants can you find? What is the most common?

How many tall and short plants can you find?

Find a tickly and prickly plant. Find a partner who closes his/her eyes. Touch him with the tickly plant; then the prickly one. Which one to them is prickly and tickly?

Telegraph poles — spiders, beetles, insects
Find a telegraph pole or a post used for street names.

List all the things living at the base of the pole.

What animals frequent the pole?

How many different kinds of plants are living at the base of the pole?

Decide what would be a good way to improve the appearance of the poles. Design a container and show how to decorate all the poles and posts along the highway with plants, flowers, etc.

Construct a model.

Soil
Find some soil, no matter how small it may be.

What type of soil is it? Feel it. Pick it up and rub it in your hands.

What is its depth, temperature?

Is anything growing in it?

Is there any soil in the drains?

Colour of natural things
Look very carefully along the highway. Look across it. Look up, and look at the ground.

How many natural colours can you find?

Which colour do you like best? Why?

Which is the most dominant colour?

Which colours are neat? Which icky? Why?

Back in the classroom the groups share their findings. Classify, and display on retrieval chart.

Somewhere else

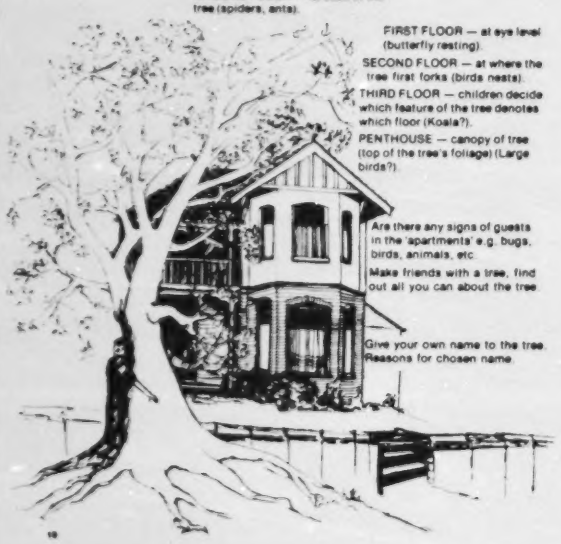
Choose another, contrasting section of highway—with grassy verges, trees along the nature strip, rock gardens outside the fences of people's homes. Prepare activity sheets which will draw attention to the natural environment, and serve as a contrast to the pre-judgement already observed.

ACTIVITIES

Tree investigation
What can you discover at: —

BASEMENT LEVEL — dig down into the ground at the tree base (bugs, snails).

GROUND FLOOR — at base of the tree (spiders, ants).



FIRST FLOOR — at eye level (butterfly resting).

SECOND FLOOR — at where the tree first forks (birds nests).

THIRD FLOOR — children decide which feature of the tree denotes which floor (Koala?).

PENTHOUSE — canopy of tree (top of the tree's foliage) (Large birds?).

Are there any signs of guests in the 'apartments' e.g. bugs, birds, animals, etc.

Make friends with a tree, find out all you can about the tree.

Give your own name to the tree. Reasons for chosen name.

Mini jungle (any overgrown area)
What variety of plants can you find?

What type of soil can you find? Is it different to the soil found on the pavement? Why?

What does this area make you feel?

How many and what kind of smells can you find?

What is the temperature of this area?

Sit in the area and write poetry, story or draw something.

Water run-off
Find out the rate of flow of water in the gutter. Place a small stick in the water and time it over (say) 10 metres. Repeat this again on different sloping gutters.

Is any soil being deposited? If so where? How much?

Silent walk
Walk along a trail or street, saying nothing.

Look for different things, e.g. different colours, trees, shades, rocks.

Feel leaves, soil, trees, bushes with your fingers, nose cheek, toes, elbows. Crush and smell the leaves, soil trees and bushes.

Tree count
Walk along one side of the highway for one block. Count the number of trees planted outside private gardens. Count the number of old/newly planted trees. Graph your results. Make comparison. Discuss future beauty or lack of beauty as result of graph result.

A tale about leaves
Find a leaf you like. What is its: —

- shape
- patterns
- veining
- arrangement on the stem
- smell
- texture
- taste
- colour

Hold the leaf up to the sky, to the sun.

Can you see any changes?

Can you find any signs of pollution on the leaf?

Is there any insect activity on the leaf, e.g. gall?

Get to know a leaf
Find a leaf, look at it carefully, notice something special about it, e.g. a crinkle, a brown patch, the veining. Find out all you can about it, know it personally.

Pile all your leaves together with others. Mix up the pile. Now find your own leaf.

Circle discovery (on grassy area)
Circle an area with string or hoop. Draw on paper what is in there. Find something which is special to you in this circle.

Write and say why you liked it.

Weathering

Find signs of weathering. (e.g. wooden fence; cracks in the pavement, cement, painted road crossings).

What are the causes, signs, rate and types of weathering?

Highway animals

Find as many animals as you can, e.g. ants, birds, dogs, bugs, snails.

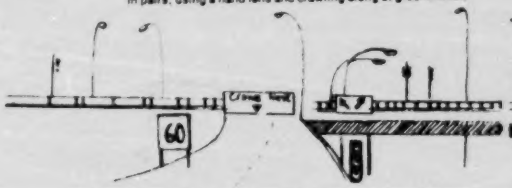
Find their size, shape, features, method of travelling, droppings.

Construct a "sweet trap" (Sugared water or honey in an open ended tin can).

Micro trail

Each person eats a sweet which reduces them to a centimetre midget just arrived from The Red Planet.

In pairs, using a hand lens and crawling along at ground level:



set up a micro trail, marking special and interesting spots with paddle pop sticks.

To show where your trail goes, mark it with white string about 2 metres long.

Using your hand lens, draw some of the interesting spots.

When you have finished, get someone from another group to share the trail with you.

Children discuss findings and make generalisations as a result of comparisons.

Build a retrieval chart which will serve to highlight the contrast.

Divert for an historical study of the original highway. This step would come out of the children's curiosity to find out whether the natural environment predominated in the early days.

For an enlargement of the historical aspects see unit "Why is the highway where it is?"

Children could build a three-dimensional model of the old highway track.

Follow on

Problem:

How could the stark concrete and highrise building section of the highway be improved?

What has man done?

Work in pairs (one person to observe and one to record).

Look at a section of the highway through a hoop.

List the ways in which man has changed the section of the environment you can see. (One person talks while the other writes — or talks onto a tape).

Change places — what difference are there in your lists?

How do people see the highway?

Take some photos or slides of the highway from different heights —

- at road level
- at your eye level
- from a second storey window
- from an 'n'th storey window

Compare the photographs you have taken.

What changes do you notice in the same thing seen from different heights?

What is missing? Discussion of the ideal highway.

Build a model of it.

Could trees be used for stoplights?

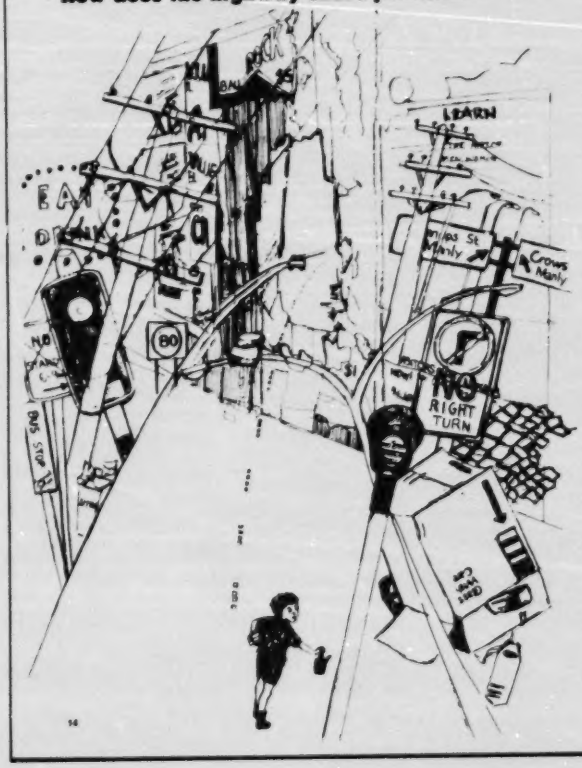
Street signs?

How would corners serve to beautify the highway?

Could animals and birds be encouraged to once again make their homes along a major highway?

How could fly-overs, foot-bridges, etc. be given a natural look?

How does the highway cause pollution?



Noise

Acclimatize with "kangaroo ears"

Sit down on the footpath (away from traffic), close your eyes and listen. List all the noises you can hear. Do you know what makes each noise? See if you can make noises that sound just like them. (Use any part of the body).

Walk along the footpath beside the highway. Are there areas or times when the noise level appears to be higher? Draw a map to indicate the noisier areas. Can you infer why?

Select various points along the highway to measure the level of the noise with an older-type tape recorder. Vary the distance away from the highway. Vary the time of recording. Graph your results.

Count the number of cars passing in one minute at different times of day and compare. Infer the reasons.

Tape (one minute duration) recordings of noises at various places along highway. Return to the same spots at different times. Take recordings back to classroom, discuss. Can you make any inferences? See if the other class members can guess where you taped them.

Make a model of the highway. Use the tapes you have made above to add realistic noises to your model. Invite your friends to walk along your highway pressing the tapes and listening to the highway noises.

STOP AND THINK ABOUT THESE

What workers create noise on a highway?

What work is affected by the highway noise?

How many cars passing have evidence of being involved in a collision?

How many taxis and buses travel along the highway in a given time?

How often do the traffic lights change? What is the sequence? Does it alter? Why? How does it affect the noise level?

Litter

Acclimatize with "object touching" "scrutinizing small things"

Pick up all the litter you can find on the footpath beside the highway. Take it back to the classroom and sort it: e.g. paper, metal, plastic. Discuss results.

Weigh the different bundles you collected — graph the results.

Place a sample of each kind of litter in a 'safe' place that is exposed to the wind/rain/sun. Write a description out of each sample, e.g. size, colour, mass. Leave for a few months. Observe closely again — what changes have taken place?

What can you infer about your litter samples?

Conduct a survey on the litter bins on the highway near you.

— Who uses them (pedestrians or motorists)?

— Who empties the bins?

— Are there enough bins?

Survey the ways children in your class dispose of their rubbish when travelling in the car, bus, walking. Compile set of rules for each.

Count the number of cars with passengers — 1, 2, 3, or more passengers. Infer where they might be coming from and going to.

How many people throw litter out of the cars?

Make junk sculpture from litter. Glue litter onto cardboard in an attractive manner. When glue is dry, spray with spray paint.

STOP AND THINK ABOUT THESE

Do we need all the wrappings? Which is the dominant litter?

STOP AND THINK ABOUT THESE

How can the air be improved? What smells can you find in the garbage bin?

Smell

Acclimatize with "smell track"

Stand beside the highway — take a deep breath sucking the air up into the top of your nose. What can you smell? Does the smell change as different vehicles pass you? Discuss your opinion with a friend.

Look at, feel and smell the leaves of shrubs growing near the highway. Rub the leaves with some white tissue paper. Repeat this action on leaves at varying distances from the highway. Report on your findings. Can you make any inferences?

Set up some white material at different stages on highway e.g. near lights, near corner, near school, for a certain period of time and observe what happens. Infer.

Place some white tissue paper over the exhaust pipes of various motor vehicles e.g. cars, taxis, buses, trucks, etc. Discuss what has happened. Discuss and display your findings.

Design a 'smellometer' — an instrument for measuring smells.

Visual

Acclimatize with "scrutinizing small" "seeing the sky" things"

Walk along the highway. Record all the things which you see that are unattractive e.g. signs, electric light poles.

Through discussion or debate suggest alternatives to some of these visual pollutants.

— Should firms be allowed to advertise their products on signs?

— What could be done to make our highways more appealing?

— What alternate colours could the traffic light poles be?

Look at the electric light poles and wires from: —

— an upstairs classroom

— lying on the grass below the pole

— standing a metre away.

Sketch each view.

How can you get electricity to houses other than by wires stretched between poles?

STOP AND THINK ABOUT THESE

Are there trees in your street? Can you find any signs of run-off pollution e.g. oil?

Future

Design a pollution free vehicle for moving people from one place to another.

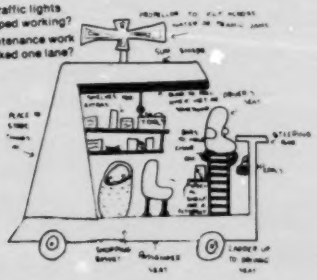
Design a machine that would get rid of the rubbish dropped along the highway.

What would happen if traffic could only travel in one direction along the highway?

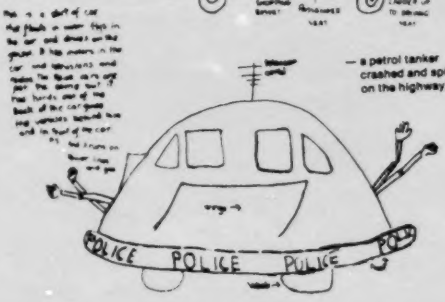
What would happen if

— the traffic lights stopped working?

— maintenance work blocked one lane?



— a petrol tanker crashed and spilled on the highway?



How does the highway affect the way people use space?

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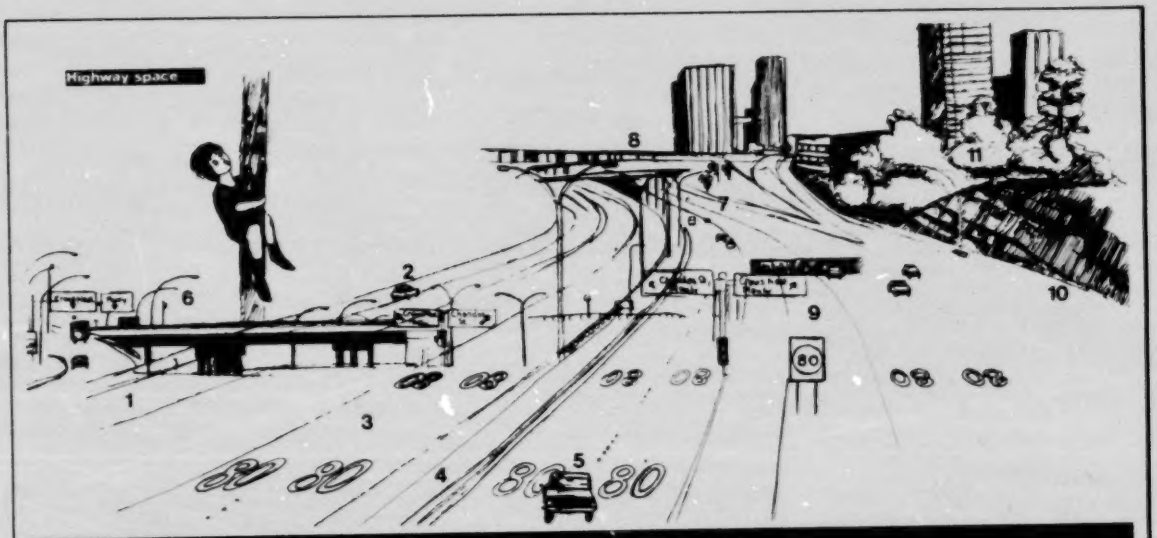
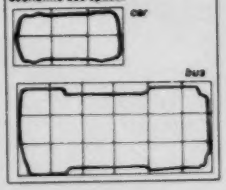


Key

1. Choose a spot outside the school. *Estimate* then *measure* the width of the highway, the width of each lane.
2. *Measure* or *research* to find out the width of : a small car (e.g. Celica); a large car (e.g. Daimler); a bus; a semi-trailer.
3. *Write* a brief report which relates the width of cars to the width of lanes.
4. *Find* sections of the highway which are wider than the section near the school, narrower than the section near your school. *Infer* reasons for the differences in width.
5. *Create* a collage in which you show people using space on the highway (e.g. people crammed in buses, people using a pedestrian crossing. Use varying materials which have different textures and whose colours give you the feeling of being crammed).
6. *Photograph* or *draw* a pedestrian crossing.
7. *Discuss* (in small groups or as a class) the problems which people, of all ages, have in crossing the highway. *Teach* the rules for safely crossing the road to younger children.
8. *Write* an imaginative story explaining a new way for pedestrians to cross the highway.
9. *Mime* a situation in which you are with a friend who is involved in an accident on the road.
10. *Estimate* then *measure* the width of the footpath. *Measure* the width of the nature strip. *Survey* pedestrians about their views on : adequacy of space ; surface quality of the footpath. *Write* a report to summarise your findings.
11. *Tally* the numbers of trees and shrubs which are growing on the footpath near your school. *Write* to your local council giving your opinion of the appearance of the footpath. *Plant* some suitable native shrubs (e.g. Captain Cook Bottle Brush) to beautify the footpath outside your school.

Key

1. *Survey* the traffic on the highway near your school, to find the number of vehicles which pass in each direction in a 5 minute period each hour. *Draw* a *graph* showing the peak traffic times in each direction. *Write* a statement explaining the reasons.
2. *Design, draw and write* about a vehicle which could transport large numbers of people during peak hours. Send your suggestions to the Public Transport Commission and ask for their response.
3. Use chalk to trace around a vehicle standing in your playground (e.g. a car, truck). In a different colour draw a grid to help you calculate the area of your tracing to the nearest square metre. *Compare* this area to that of a bus measured in the same way. What conclusions can you reach about the economic use space.



4. *Survey* the number of vehicles on the highway which are used for — transporting people, transporting goods. Which group is larger? Why?
5. *Interview* the drivers of some of the following vehicles : small car, large car, bus, delivery van, truck, push bike, motor bike. Ask questions about the space inside his vehicle; the amount of highway space his vehicle uses ; the space his vehicle, together with other vehicles, uses.
6. *Count* the number of cars with passengers (None, 1, 2, more than 2). *Graph* your results. *Discuss* this question : "Should laws be passed prohibiting cars carrying fewer than three people during peak hours." Ask the drivers about how they feel about these spaces.
7. *Discover* what rules control the space used by vehicles and people on the highway. Who made the rules? Why? Do they work? Do you have any other suggestions?
8. *Interrogate* a car (grill it). Ask your friend to be the car. Ask him to justify the use of highway space. *Tape* your interrogation.
9. Make a *simulation* game in which you show the use of highway space by vehicles and people, road rules and traffic flow.

Key

1 *Walk* along the highway for one block. List the types of houses and buildings you see. Classify into groups.

2 *Interview* unit resident. How long lived there? What kind of house, flat or unit lived in before present dwelling? What are the advantages and disadvantages of living along the highway?

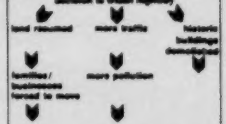
3 *Look* at the use of buildings. Was this their original use? What signs of building alteration can you see? e.g. has the self-service store always been that? Look at the residential and/or commercial buildings. How are they maintained?

4 Take a hoop and view one of these buildings. *Describe* its shape, colour, design, texture, height. Make a sketch.

5 *Count* the number of units in a block of units near your school. How many families could live in this block? How many houses would be needed to accommodate the same number of people? What is the difference in the amount of land space used? *Make a model* to communicate your findings.

6 How are buildings near your school used? *Classify* the buildings according to usage. *Graph* your results and *write* some statements.

7 Make a *prediction chart*. What would happen if the D.M.R. decided to widen the highway near your school?



8 *Write* an optic pattern that will fit into a tall building, or a squat building and which expresses the feelings people might have who live in the building.

9 *List* words which describe different types of buildings (e.g. comfortable, welcoming). *Write* a poem about one of these buildings, using your listed words. Illustrate your poem.

10 *Interview* a shopkeeper to find views about the advantages and disadvantages of being on the highway. Consider some of the following: busy periods, slack periods, holidays, clearway restrictions, parking...

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Why is the highway where it is?
How has it changed and why?

History yesterday, today, tomorrow.

Take a time capsule to the past and the future.
What do you see?
Build a model of the highway of the past and future.

Find all the things decaying and wearing e.g. nails rusting, paint peeling, weathering. How does this happen?

Make a log of 15 minutes on the highway.
Make a log of the highway in the past, and for the future.

Design a vehicle using the highway 100 years in the future.

Find all the things on the road surface, below it or beside it which are obsolete, e.g. gutters, crossings, lights, signs etc. Why are they no longer used?

What changes have occurred on the highway?
e.g. usage of public and private transport, car tyres, changing road surfaces, technological advances in road making.

Where?

Find the history of street names.
Write to local councils, D.M.R., historical societies, progress associations.

Find the date on a tap, a plaque on a building.
What was on or using the highway when they were installed?

Interview a local resident.
Make a play about an interview of a person 100 years ago.

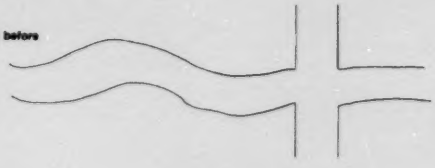
Long load,
Wide load,
Accidents, parades, convoys etc.
Observe the consequences of the above.
Record by art, drama, poetry.

Make a model of the highway now and in the past — Make it 3D.

Why?

Collect photographs of bygone days along the highway.
What were cars, roadsurfaces, buildings, clothing like?
How have these changed?

Maps before



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Maps now

What's a Name Street ▶

Where to Avenue ▲

How many buildings on the list below do you see?

Check here	Structure	Symbol
☐	Tree	
☐	School	
☐	Units	
☐	Offices	
☐	Shops	
☐	Light poles	
☐	Factory	
☐	House	
☐	Service station	
☐	Park	
☐	Traffic lights	

Add anything not on the list

Draw a highway you would like for the future

Resources and energy on the highway

The concern

What resources and energy are used in association with the highway?

Where do they come from?

Terms used

Energy is the capacity to do work (i.e. the ability to make something move).

Resources are things which are seen to be useful and are used by people.

Environmental chains

An environmental chain is taking an object and tracing it back to the soil. In these steps find the various processes the object has been through and the jobs and energy used in the process.

Some objects could be: —

Telegraph pole; traffic light; the gutter; the bricks; litter bins; paint used in road crossings; tar on road; cars; telegraph wires; cement.

The beginning

Before attempting the problem, children must have an awareness and sensitivity to the environment.

The creating of this sensitivity can be attempted through activities using the senses — taste, sight, smell, hearing, touch. This process is called acclimatization.

Try this!

Sherlock Holmes Ramble

List all the natural resources used and seen on the highway.

Examine from different viewpoints

Select something you have seen many times.
Look at it from different angles, on hands and knees, lie on your back, hold it up to the light, hold it in your hand ten centimetres from your eyes.

Telescopic framing

Join your fists together to make a tubular frame. Look through your frame to one object. What has been used in its construction? Find other objects around you which "fill" your frame. Make your frame square and look for objects.

Perception points

Make "perception point" cards e.g.

— can you spot 3 different types of resources used in buildings?

— can you find 3 different types of energy used on the highway?

Resource hooping

Circle an area with a hoop. Find a resource in this circle. Share it with a friend. Can you find this resource in another area. Hold the hoop up in the air to frame objects in the distance. Can you find your resource there?

Micro stroll

Have a micro stroll with a hand lens. Crawl on hands and knees about one metre. How many resources can you find?

Object touching

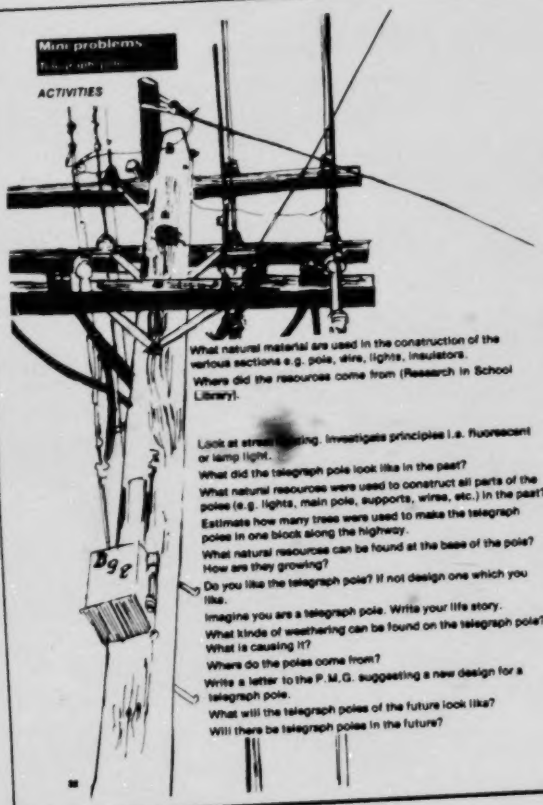
See earlier section.

Blindfold walk

Blindfold a group and walk to an unknown building. Let the children feel the building. What is it made of?

Mini problems

ACTIVITIES



What natural material are used in the construction of the various sections e.g. pole, wire, lights, insulators.

Where did the resources come from (Research in School Library).

Look at street lighting. Investigate principles i.e. fluorescent or lamp light.

What did the telegraph pole look like in the past?

What natural resources were used to construct all parts of the poles (e.g. lights, main pole, supports, wires, etc.) in the past?

Estimate how many trees were used to make the telegraph poles in one block along the highway.

What natural resources can be found at the base of the pole? How are they growing?

Do you like the telegraph pole? If not design one which you like.

Imagine you are a telegraph pole. Write your life story.

What kinds of weathering can be found on the telegraph pole? What is causing it?

Where do the poles come from?

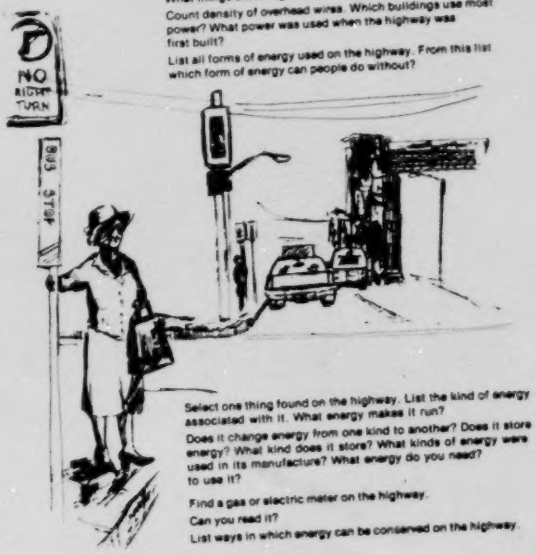
Write a letter to the P.M.G. suggesting a new design for a telegraph pole.

What will the telegraph poles of the future look like?

Will there be telegraph poles in the future?

Energy

ACTIVITIES



What energy is used on the highway (e.g. sunlight, petrol, electricity, muscle)?

How is it used?

Where does it come from?

Find ways to conserve this energy.

Find alternative sources of energy.

Which type of energy is being used most of all?

What things are using this most used energy?

Count density of overhead wires. Which buildings use most power? What power was used when the highway was first built?

List all forms of energy used on the highway. From this list which form of energy can people do without?

Select one thing found on the highway. List the kind of energy associated with it. What energy makes it run?

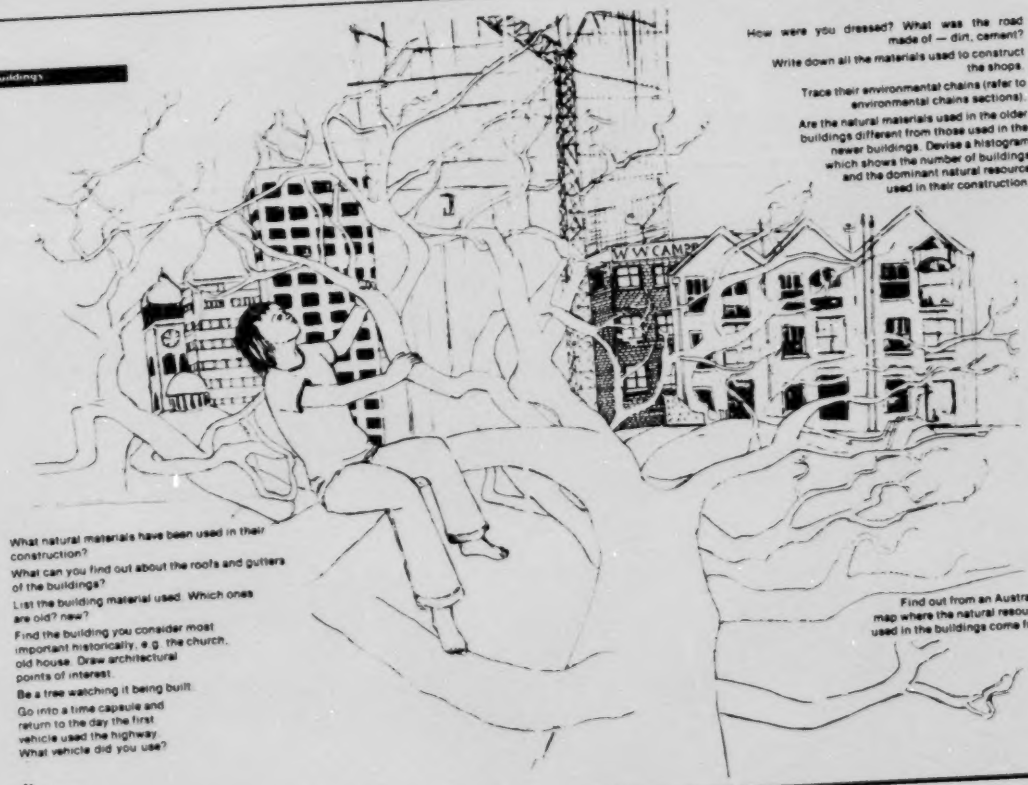
Does it change energy from one kind to another? Does it store energy? What kind does it store? What kinds of energy were used in its manufacture? What energy do you need to use it?

Find a gas or electric meter on the highway.

Can you read it?

List ways in which energy can be conserved on the highway.

Buildings



How were you dressed? What was the road made of — dirt, cement?

Write down all the materials used to construct the shops.

Trace their environmental chains (refer to environmental chains sections).

Are the natural materials used in the older buildings different from those used in the newer buildings. Devise a histogram which shows the number of buildings and the dominant natural resource used in their construction.

What natural materials have been used in their construction?

What can you find out about the roofs and gutters of the buildings?

List the building material used. Which ones are old? new?

Find the building you consider most important historically, e.g. the church, old house. Draw architectural points of interest.

Be a tree watching it being built.

Go into a time capsule and return to the day the first vehicle used the highway. What vehicle did you use?

Find out from an Australian map where the natural resources used in the buildings come from.

Road surfaces and footpaths

ACTIVITIES

Collecting Make a collection of found objects. Classify man-made or natural. Which group is larger? Why?

Design Find out why the road is designed as it is — macadamised. What prompted this invention? Where?

Suggested smelling activities Do different surfaces have smells? Why? Why not? Can you describe any smells? Paint a smell. Write about a smell. What does a particular smell remind you of? Does the road smell differently when it is raining from when it is sunny?

Suggested tasting activities Would you like to taste the surface you are investigating? Why? Why not? Is it possible to taste the surface you are investigating? If you could, what would it taste like? (tasting the space above the highway, tasting the space below the highway — poetry activity associated with, say, art activities).

Gravel in drives Where did the gravel come from?

What colours can you find in the gravel?

Make friends with a pebble — your pet pebble.

How hard is the gravel? Are all pebbles of the same hardness?

List other materials used in driveway constructions.

Letter writing Write a letter to the D.M.R. requesting information about the people involved in designing and building a highway. Write a letter to the N.R.M.A. requesting information about desired road conditions from the point of view of car owners and safe driving.

Garbage bins Find the composition of the bin. Use an environmental chain to trace the natural resources used in its construction.

What resources have been thrown away in the garbage bin? Could these resources be re-cycled? List ways of re-cycling them.

Traffic What natural resources have been used in the construction of cars?

What type of energy is used to drive the car?

List the energy consumption of the various makes of cars (km per litre).

Which type of car uses most energy and which uses least energy?

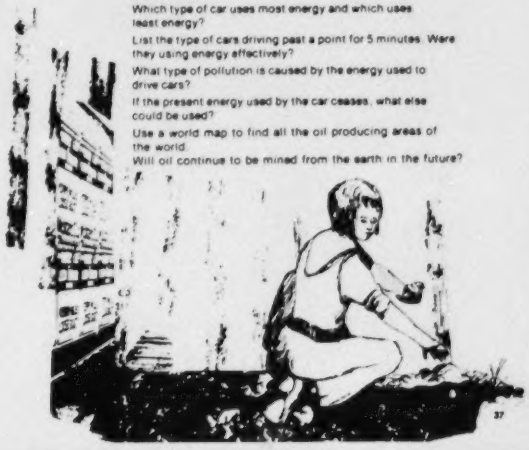
List the type of cars driving past a point for 5 minutes. Were they using energy effectively?

What type of pollution is caused by the energy used to drive cars?

If the present energy used by the car ceases, what else could be used?

Use a world map to find all the oil producing areas of the world.

Will oil continue to be mined from the earth in the future?



Resources

State Pollution Control

Department of Main Roads

Transport Department

Police Department — *Police Traffic Branch*
Police Education Branch

P.M.G. Department

Gould League of N.S.W.

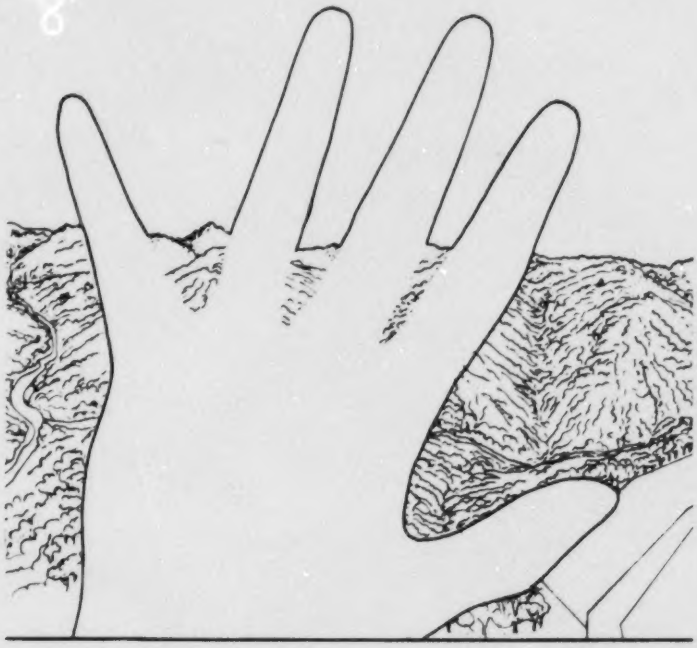
Local Historical Society

Local Council

Local Teachers Centre

Burwood Resources Centre for Films

Booklet from Scouts Organisation on Litter



Davidson Park

Kuring-gai College of Advanced Education.

Introduction

This unit involves children in the study of an urban natural park viz. Davidson State Reaction Area and the conflict between the maintenance of the bush and the pressures associated with its use and abuse by people.

Aims

Attitudes

1. To appreciate the value of an urban natural park such as Davidson Park as a recreational resource for people.
2. To appreciate the detrimental impact on the park of many human actions.
3. To become aware of and to appreciate the beauty and life within the park.
4. To be concerned for the conservation of the still extensive relatively natural areas of the park, especially where subject to marginal encroachment.

Knowledge

1. To identify types of plants, animals and landforms and recognise some of the interrelationships between them.
2. To distinguish between exotic and indigenous plants and animals.
3. To recognise those practices of man which endanger the natural state of the park.

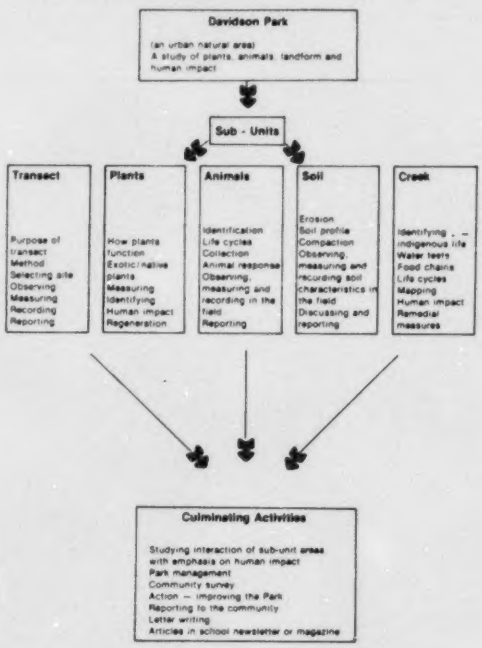
Skills

To develop the skills of observing, classifying, inferring, predicting and generalising.

Communication and Action

1. To report findings and discuss the human impact on the park.
2. To predict the future of the park.
3. To weigh up the detrimental and constructive actions.
4. To act on findings by establishing a code of behaviour, by cleaning up and regenerating areas of the park and by influencing others to do likewise.

Structure of this unit



How to use this unit

This unit, although written with Davidson Park (officially known as Davidson State Recreation Area) in mind, is readily adaptable to any similar area of natural bush. It is advisable that such an area be in close proximity to the school so that field trips need not involve costly and time-consuming transport.

Schools that have a "natural area" in their grounds will be able to carry out many of the suggested activities.

This unit, as with the others in this series, is ideally suited to an integrated approach. It is also possible to use each sub-unit in isolation.

The "transect" sub-unit can be used in three different ways —

i as part of the introduction, where the transect becomes a familiarisation activity,

ii as the central focus of an integrated theme,

iii as a culminating activity where the children use the knowledge and experience gained from other sub-units to gather, co-ordinate and display their transect data.

Senior primary years could be expected to benefit most from this unit but selection and adaption for junior primary or infants' years would not be difficult.

Finally, because of the effect of human intrusion and of servicing facilities associated with housing development, emphasis is given throughout this unit to man's impact on the park.

Further information

Teachers are requested, as a matter of courtesy, to contact the Park Ranger, Mr. Max Pritchard (headquarters: Ferguson Street, Forestville, phone 451-3479), when planning an excursion to the park. Mr. Pritchard would be interested in meeting the children on one of their visits to talk with them about such matters as problems of park management and to answer questions. He could also advise on suitable access points and trails.

Mr. George Champion, Principal of Darlinghurst P.S. (phone 31-7295) is a member of the Davidson State Recreation Area Trust and of the Upper Middle Harbour Conservation Society. He knows the park well. Teachers are welcome to contact him with any queries about the use of the park and for information on its history.

Possible introductory activities for the whole unit could be:

i skill development — using reference materials,
designing experiments,
identifying and classifying sample plants and animals,
mapping exercises;

ii an undirected 'walk, look and talk' in the park;

iii consideration of safety precautions and conservation measures.

All native plants and vertebrate animals are protected in the park, but samples of plants may be cut for educational purposes provided they are not on the list of *Protected Flora of N.S.W.* It is suggested that you limit such samples to one per class or at most, one per group. Sample only those plants which are relatively common. Likewise limit the woody fruit taken since these are usually a seed source for regeneration following fire.

Some ideas for integration

Art*

Collage from natural materials
Grafito e.g. parrots
Drawings of native plants and animals
Bird chart
Landscape
Colour in nature
Texture e.g. bark rubbings

Maths

Shapes in nature
Measuring — diameter, circumference, height of trees
Use of compass
Use of clinometer
Measuring temperature and evaporation
Graphing

Craft*

Copper tooling — native flora and fauna
Poker work — bush scene (placemat)
Mobiles — featuring native birds etc.
Weaving with grasses
Dyeing with natural materials
Environmental craft e.g. koalas from seeds, cones, bark etc.
Use of cameras

Social Studies

Mapping skills
history
The local area — land use
industry
Conservation of naturalness
Pollution studies — clean-ups
Community involvement — surveys etc.

Science

Transect
Plant study
Animal study
Soil study
Creek study

Davidson Park

Oral Expression

Lecturettes on observations (informal and formal)
Class and group discussions e.g. What this park means to our community
Debates e.g. Mini and trail-bikes should be allowed in the park

Written Expression

Creative writing e.g. impressions of the bush, man's impact
Haiku and other form poems
Descriptions
Reports, diaries, field trip books
Articles e.g. for the school magazine
Letters

Reading

Books on Australian wildlife
Articles on conservation
Poems on Australian wildlife

Research

Use of reference books
Filmstrips
Collecting relevant articles from newspapers and magazines

*Natural materials should not be collected in the park.

Sub-Unit 1 Transect

Objectives:

To identify the main regions of the park i.e. ridge, slope, gully and creek.

To distinguish between these natural areas by noting similarities and differences.

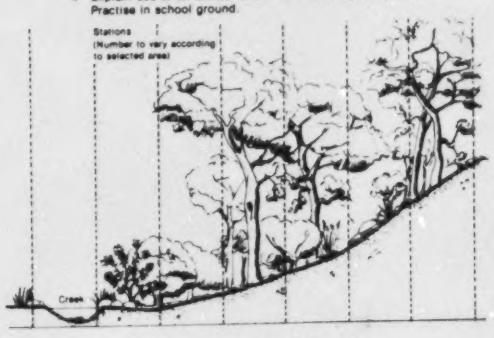
To record their impressions.

To identify and classify the components of each area.

To observe man's impact — "good" and "bad".

Introductory activities

1. Discuss "What is a transect?"
2. Form class into groups and allocate transect stations. Nine or ten stations 25-50 m apart depending on location of transect.
3. Have each group list activities (see Field Activities No. 3) or give each child a printed list.
4. Explain use of clinometer or similar measuring equipment. Practise in school ground.



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5 Explain use of Visualmaker, Polaroid camera or other cameras available. Practice by photographing suitable material in the school grounds.
Plan a record of unit in slides or photographs.

Field activities

1 Select a suitable track or fire trail to give good access to a typical part of the park with good examples of ridge, slope, gully and creek.
2 Equip children with measuring and collecting equipment.
3 On reaching transect stations children —
i Write down observations (note evidence of man).
ii Sketch plants, animals, unusual features.
iii Collect soil samples, rock samples, leaf litter, animals etc.
iv Measure tree and other plant height. Use clinometer or alternative method.
v Take photographs — use Visualmaker if available, for close-ups. Polaroid camera for a general view and interesting features.

Useful equipment
— for fieldwork and classroom

Hand lens	Tapes 30 m
Binocular microscope and lamp	Clinometer
Plastic bags and rubber bands	Rucksack with food and drink
plastic jars	Clipboards
White plastic icecream containers	Paper for written recording and artwork
Scoop nets	Drawing materials
Secateurs	Cameras e.g. Polaroid and Visualmaker
Identification tags	Field guides
Rulers 30 cm	First aid kit
Metre rules	

Post-field activities

1 Each group prepares a chart or other display of station activities.
2 Connect each display to a profile of transect.
3 Write reports of this activity.
4 Prepare talks to be given to class about discoveries and impressions.

Sub-Unit 2 Plants

Objectives:

To distinguish native plants from exotic plants.

To work out how infestations occur and spread.

To identify and understand man's role in
i aiding exotic infestation,
ii affecting native plants in other ways.

To predict results of continuing unchecked infestations of exotics and destruction of native plants.

To derive solutions for the prevention, reduction and/or elimination of exotic infestations.

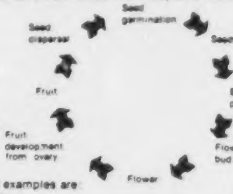
To identify attitudes of people towards natural vegetation as evidenced by their actions (both detrimental e.g. dumping of garden refuse and constructive e.g. conservation groups).

Concepts and vocabulary

Native, indigenous, exotic, infest, infestation, fringe infestation, invade, invasion, overcome, choking, radial, isolated, seed dispersal, conservation, regeneration, cycle.

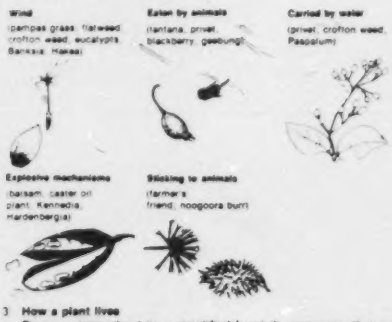
Introductory activities

1 **Life cycle of plants**
Revise or learn about the life cycle of flowering plants.

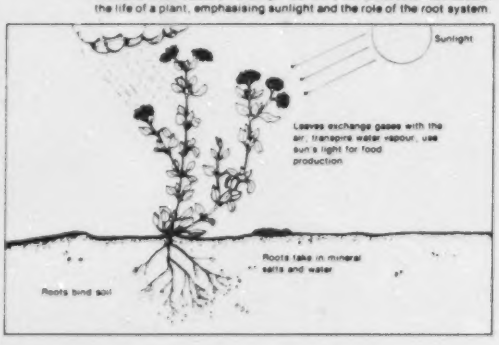


Good examples are:
Citrus
Cassia
privet
Acacia
as fruit and flowers may be seen on the plant at the same time or fruit development following flowering is very obvious.

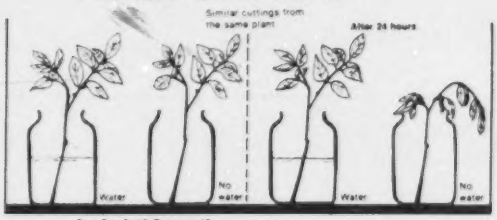
2 **Seed dispersal**
Study methods of seed dispersal.



3 **How a plant lives**
Revise or learn about (in a simplified form) the processes that sustain the life of a plant, emphasising sunlight and the role of the root system.

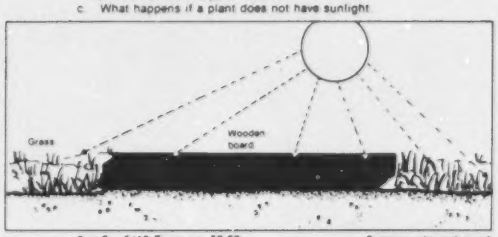

Sunlight
Leaves exchange gases with the air, transpire water vapour, use sun's light for food production
Roots take in mineral salts and water
Roots bind soil

EXPERIMENTS
Try to have children work out ways to tackle problems.
The following examples are just a few suggestions.
a What happens if a plant does not have water?



See Sc. 5/13 Trees p. 43

b How does a plant obtain water?
Grow an onion in a jar of water.
c What happens if a plant does not have sunlight.



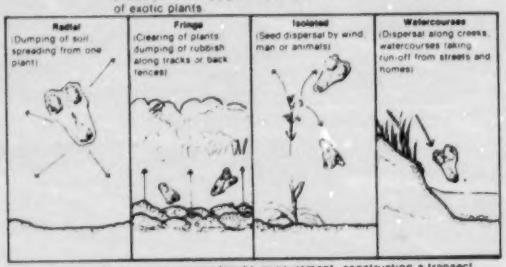
See Sc. 5/13 Trees pp. 58-59

4 **Exotic and native plants**
a Define these words. Use as examples: plants (lantana and banksias), animals (fox and kangaroo), cars (Holden and Volkswagen).
b Observe the size and structure of plants in the playground and home gardens and classify as:
Trees. Shrubs. Climbers. Grasses and other Herbs. Ferns.

c Classify leaves as exotics or natives. In comparing the two groups, make generalisations about their toughness, size, dryness etc.

This activity, as do some others, provides opportunities for identification of plants.

d Propogate and compare growth rates of exotic and native plants.
e Compare the susceptibility to wilting of exotics and natives. Cut small branches of similar size and leave out of water. Make observations over several days.
f Explain or revise the necessity for and rules governing the protection of native flora. Examine reasons for protecting some plants yet destroying others. Explain the concept of infestation of exotic plants.


Radial
(Dumping of soil spreading from one plant)
Fringe
(Clearing of plants, dumping of rubbish along tracks or back fences)
Isolated
(Seed dispersal by wind, man or animals)
Watercourses
(Dispersal along creeks, watercourses taking run-off from streets and homes)

g Explain and practise height measurement, constructing a transect, measurement and recording of plant distribution, compilation of a checklist (see below).

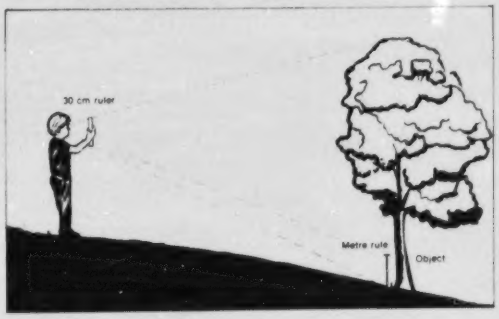
Field activities

1 **Measurement of heights of plants at different sites**

Objectives:
To relate size of plants to site (ridge, slope, gully, home garden).

To gain skill in height estimation using an indirect method.

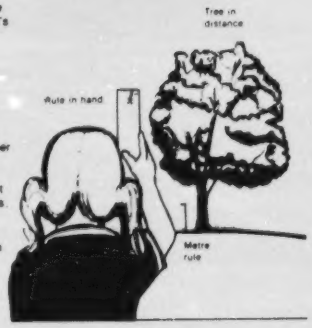
a Determine height of plants using proportion technique.



— Place metre rule at foot of object.
— Walk back from tree holding ruler at arm's length until 30 cm mark corresponds with tree top and 0 cm mark with the base.
— Read off height of the metre rule on the 30 cm ruler.
— Calculate the number of these lengths in the 30 cm. Your answer is the height of the tree in metres.

e.g. $\frac{30\text{ cm}}{5\text{ cm}} = 6$

Height of tree is 6 m.



b Take up to ten readings at each site. Either record all readings on a chart or take the average.

Heights of plants at different sites

Site	Type of plant	Trees	Shrubs	Grasses/Herbs
Ridge				
Slope				
Gully				
Home garden				

c Discuss results and record findings.

2 **Identification and observation of plants**

Objectives:
To identify native plant types e.g. spider flower, banksia. To identify particular species of native plants by their common name and/or scientific name e.g. grey spider flower or *Grevillea buxifolia*, old man banksia or *Banksia serrata*. To identify important exotic plants.

a Identify plants by matching with pictures in books. Children work in pairs, compiling data on one or several selected species e.g.

Name
Native or exotic
Type of plant
Where found
Flower
Fruit
Seed dispersal

See note in introduction re picking plant specimens.

b Compile a checklist of plants.

See Sc. 5/13 using the Environment. 4 Ways and Means p.55.

Name	Plant Type				Where found						Frequency		
	T	S	H	G	C	Ridge	Slope	Along creek	Near track	Park edge	Near drainage	Few	Some	Common
Pampas grass														
Lantana														
Large privet														
Small privet														
Crofton weed														
Kikuyu														
Convolvulus														
Balloon vine														

Other exotics include: blackberry, cotoneaster, bamboo, wandering jew, honeysuckle, flatweed, buffalo grass, paddy's lucerne.

Plant type key

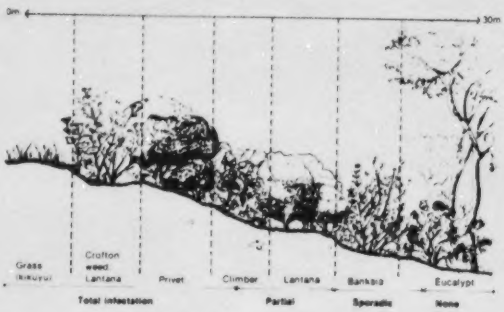
T : Tree
S : Shrub
H : Herbaceous plant
G : Grass
C : Creeper

c Identify plants using keys
e.g. Forestry Commission key to *Trees of the Sydney Region*
J. Child, *Trees of the Sydney Region*. Periwinkle books.
Kuring-gai C.A.E., *Key to the more common banksias of the Sydney Region*.

3 **Study weed infestations**

Objective:
To examine the causes of and problems associated with weed infestation of bush areas. Locate and examine infestations.

a Note where they occur e.g. proximity to track, park edge, drainage.
b Estimate area of infestation by pacing sides.
c List exotics present.
d Note type of plant e.g. shrub, grass.
e List native plants present and note whether healthy.
f Assess severity of infestation e.g. total, partial, sporadic.
g Try to identify source of infestation e.g. soil dumping, rubbish, wind dispersal.
h Map the infestation or construct a transect through it from a boundary to 100% native area.



i Try to find out how exotics compete with natives —
  i Examine root systems of privet, lantana etc.
  ii Note methods of reproduction e.g. runners, efficient seed dispersal.
  iii Count and identify seedlings underneath rampant infestations.
  iv Observe dead natives underneath climbers. Shade and lack of water can kill natives.
  v Examine grass. Does this choke the surface?
  vi Ask children to suggest other ways in which exotics compete.
j Observe and record other ways in which natives are being influenced e.g. track construction, erosion, prescribed burning.

Examples of exotic infestations can be seen at Barrabrui, down the pipeline track, at Acron Oval and along park edges, fire trails and watercourses.

See Sc. 5/13 Using the Environment. 3 Tackling problems
Part 1 pp. 16-20
Part 2 pp. 20-31

Post-field activities

1 Group or individual projects e.g. types of infestations.
Encourage a variety of methods of recording and display e.g. information sheets on plants, checklists, maps, transects, and of reporting e.g. discussions, mini-lectures.

2 Discussion of man's role in creating infestations.
  i By dumping rubbish, soil and garden refuse on the park edges.
  ii By bulldozing soil to construct banks for playing areas.
  iii By transporting seeds while walking or riding in the park. Weeds may then spread from track edges.
  iv Seeds can be blown into the park or carried by birds from home gardens.
  v Unnatural drainage from home gardens, home drains, street drains, septics, leaking sewers provides the water exotics thrive on.
3 Any solutions?
After assessing the present situation, children predict the results of the continuation of present practices. Then they can suggest actions which might prevent, reduce or eliminate some of the exotic infestations e.g. rules — "Don't dump soil"; action — setting up a public display, conducting 'grubbing bees'.
4 Review the range of human activites in the park, both legal (e.g. fire trail construction, prescribed burning for hazard reduction, servicing facilities viz. sewerage works, high tension cables) and illegal (e.g. rubbish dumping, mini/trail bike riding). What impact do they have on the vegetation? Should they take place? Weigh up the pros and cons. Consider the policies of the M.W.S. & D. Board and the Electricity Commission (e.g. how effective are their programmes of regeneration?), the Davidson State Recreation Area Trust, the Upper Middle Harbour Conservation Committee.

Sub-Unit 3 Animals

Objectives:

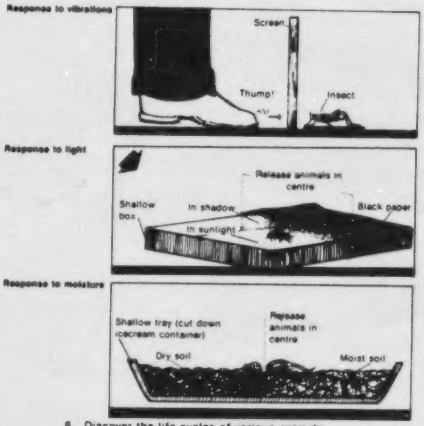
To acquire a sensitivity to the needs of living things.
To develop skills of observing and reasoning through the study of animals.
To identify the most common animals by name and describe their characteristics.
To understand the impact people make on animal populations in an urban natural park.

Introductory activities

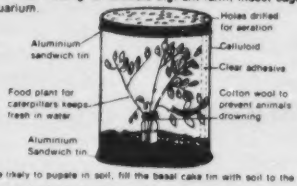
1 Through discussion and research, have children attempt to predict what bush animals should be found in their immediate natural area. A 'presumptive' list of mammals, birds and reptiles for Bantry Bay is given in *Bantry Bay — the case for conservation*, published by the Upper Middle Conservation Committee.
2 Using the playground or nature trail, find an animal e.g. insect, slug, spider. Draw it as carefully as possible. Hand lenses can be very useful. Then try to identify it. Keys such as that in *Sc. 5/13 Minibeasts, pp. 76-87* could be used by older children. However the most common method of identification for primary children will be by matching with pictures in books.
3 Classification of animals according to the children's own criteria e.g. fast movers, slow movers; more than 8 legs, 8 legs, 6 legs, no legs; running, hopping, flying, burrowing.
4 Build up a class chart showing animal habitats.

Habitat / Animal	Tree trunk	Tree leaves, twigs	Shrubs	Grassy area	Leaf litter	Sealed play area	Cracks in paths	Gutter	Under Rocks	etc
Ants										
Spiders										
Moths										
Butterfly										
Antlion										
etc										

5 Test the reponses of animals to various stimuli e.g.
Vibration — do they appear to feel vibrations?
Touch — try touching antennae and other parts of animal's body.
Light — do they avoid direct light?
Moist and dry conditions — do they have a preference?
Discuss observed responses and relate to the animal's needs and its habitat.



6 Discover the life cycles of various animals.
See Sc. 5/13 Minibeasts, pp. 56-75 and books on Australian insects, spiders etc.
For observation in the classroom, it will be necessary to improvise or purchase housing for animals e.g. ant farm, insect cage, terrarium, aquarium.



N.B. If caterpillars are likely to pupate in soil, fill the basal cake tin with soil to the top of the rim.

Insect cages similar to this can be purchased from:
Nature & Field Hobby Centre, 24 Burlington Avenue, Crows Nest.

Field activities

1 Choose a track giving access to a typical part of the park with good examples of ridge, slope and gully and some areas of weed infestation. Select suitable stations on a pre-visit.

2 Distribute equipment.
Each group could be supplied with:
a Hand lens.
b Plastic bags and clear plastic jars to collect and examine specimens (these can be returned after observations have been made).
c Spoons (to pick up animals without causing harm).
d Equipment for classroom designed experiments.
e Clipboards.
f Paper and pencils (although more teacher-directed, activity sheets with questions, tables etc. can be used).
g String marked off in metres.
h Trowel.

3 At selected stations, each group marks out an area of 1 square metre (or possibly 2 m x 2 m) and makes observations of all the animals they can find in that area.

4 Animals can be identified where possible and tabulated according to their microhabitat.

Station 1 — ridge top

In leaf litter	Under rocks	On shrubs	In or on moss	Among sedges	On rock outcrop
Slaters	Lizard				
Ants	Ants				
Spider	Bush cockroach				
Millipede					

Other microhabitats might be: on leaves of tree, on or under bark, in hollowed tree trunks, in human litter, on weeds, under logs, on track etc.

5 Each child in a group could then select a different animal and record observations of it in a booklet or on a card.

Name of animal (if known)

Number present

Where found (microhabitat)

Description of microhabitat

Was the animal feeding? If so, on what and how?

If not, can you infer what its food might be? Explain.

What was the animal doing?

Describe how it moves.

Did it seem to be aware of you observing it? What were its reactions?

The animal can be drawn on the back of the card and any further observations noted if time permits.

6 With a large number of children, reptiles, birds and mammals sighted will probably be few. Try to identify and record observations of those seen. Can you find any evidence of their presence or of that of feral cats and dogs?

Post-field activities

1 Groups combine data from each station. Displays are set up and individual children report.

2 Discussion of findings.
Were their differences between stations in terms of
a the number of animals present?
b the variety of animals present?
Especially compare track sites and areas of weed infestation with more natural areas.

3 Marsupials would not be easily seen, even if present, because most are nocturnal and some are very small. Plan a visit to the zoo to see a selection of those mammals, birds and reptiles (refer to list in *Bantry Bay: A Case for Conservation*) which either live in or are likely in the past to have inhabited the area. Include a visit to the nocturnal house. (A Zoo Education Officer will plan an associated lesson given sufficient notice, preferably 2 months, and details of your requirements).

4 Discuss reasons for decrease in species present and in numbers — chief amongst them being destruction of habitat and the depredations of feral cats and dogs. Which native animals might suffer most? Are there any native animals which have adapted to human habitation and whose numbers might have increased? — possible the brush-tailed possum and the currawong.
Are animals important to our park? How can we protect them?

5 Invite an interested naturalist in the community to talk to the class.

Sub-Unit 4 Soil

Objectives:

To identify the ways in which people have had an impact on the soil in the park and to understand the consequences of such impact.
To work out policies and rules that would minimise the impact on the soil.

Concepts and vocabulary

Slope, ridge, erode, erosion, soil horizon, layer, leaf litter, compact, compaction, process, aeration, turf, sandstone, shallow cross-section.

Introductory activities

Refer to *Science 5/13* (*Using the Environment 2 Investigations Part 2*) *pp. 59-62*.

1 **Soil erosion**
Compare the effect of running water on turfed soil, soil with a covering of leaf litter and loose bare soil.

2 **Soil profile**
Observe and identify main soil horizons (keep this simple e.g. litter layer, top soil, sub-soil).

3 **Animals in the soil**
Extract animals from leaf litter and from soil. Set up a wormery.

4 **Soil compaction**
Compare the growth from seed of plants in compacted, natural and aerated (well forked) soil.

Field activities

Aim: To compare and contrast soils in different areas of the park and in the home garden.

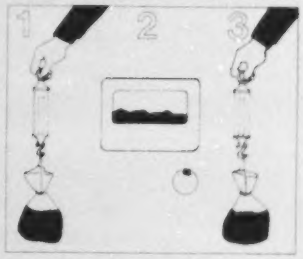
Planning:
1 Locate suitable sites before excursion e.g. ridge, track, slope, eroded section of track, creek bank, home garden.
2 Plan for activities to be carried out in one session so that comparisons are valid.
3 Prepare a master table (large sheet of cardboard) for tabulation by the children of their results.
4 Share out activities to small groups of children.

5 Familiarise the children with their activities before the field trip.
6 Make each group responsible for its equipment.*
7 Arrange to visit a home garden en route to or from the park.

Procedures for activities:

1 Compaction
   a Scrape away layer of dead leaves.
   b Dig or jab with wooden or metal spike.
   c Describe soil as soft, firm or hard.
2 Profiles
   a Dig a soil pit (mattock or spade) or cut a fresh surface where soil horizons are already exposed along a track.
   b Measure the horizons.
   c Draw a diagram of the profile.
   N.B. Simple terms such as litter layer, top soil and sub-soil can be used.
3 Description of top soil and sub-soil
   a Feel soil and describe it in one or two words e.g. sticky, sandy, crumbly, powdery, clayey.
   b Describe the colour of the soil.
   c Comment on the amount of rock in the soil.
   d Comment on the number of roots in the soil.
4 Water content
   a Collect 500g of top soil and of sub-soil. Use plastic bags and a spring balance.
   b At school, dry soil by leaving it set out. An oven may be used at a very low setting.
   c Reweigh and calculate water content and carefully replace the disturbed soil.

*Equipment for excursion: clipboards, pencils, rulers, metre rules, plastic bags, icecream containers marked with name of site, 500 g spring balances, mattocks, spades, metal or wooden spikes.



Post-field activities

1 Record results on the master chart.
   Group reporting.
2 Discussion of results:

Possible discussion questions	Likely findings
Compaction	
Where was the soil most compacted?	Level tracks are most compact.
How was this caused?	Caused by man's use - walking, driving, riding.
How does compaction of soil affect plant growth? (Refer to experiment in introductory activities).	Compaction retards growth of plants, limiting air supply. Also, such use destroys plants and their roots.
How else is the track soil different?	Top layers of soil, beneficial to growth have been removed.
Erosion	
Why has the soil been washed down?	Track construction has removed protective plants and litter and has allowed water to erode the soil resulting in barren, rocky gouges.
Where has the soil gone?	Soil is removed to creeks where it silts up ponds,
What effect does it have?	destroying life there.
Water content	
Where is the driest part?	The ridge is the driest part due to shallowness,
Why is it the driest part?	exposure and gravitational movement of water.
Has man changed this? How?	This is modified closer to homes where water is added from garden seepage.
What might grow there now?	This allows weeds to grow thus displacing the slow growing native plants.
How does water help growth?	More water down slope results in taller growth. Plants tend to be greener and less dry.
Would anything else affect growth?	The soil is softer and of a deeper colour.
Description	
How did soil appearance differ between sites?	Dry to dryness, ridge soil is the most powdery and lightest in colour. It is also rocky but not as much as on eroded tracks.
Bush/garden soil	
Why are garden soils so different?	Garden soils are often partly imported for filling and top dressing. Often compost is added to vary it further. Soil is often aerated by forking.
What usually happens to leaf litter in the home garden?	Great contrasts are seen in all facets.

3 Predict the effect on the soil in the park of the continuation of human activities at their current levels or of the proliferation of these activities in the future.
4 Discuss policies and formulate rules which could minimise the future impact by people using the park. Design illustrated poster setting out rules.

Sub-Unit 5 Creek

Objectives:

To study an urban creek.
To determine man's impact on this creek.
To make judgements and take action, based on observations: —
Is the water polluted?
Is there life in or on the water?
Are there any weeds (exotics) along the banks?
Does anyone use the area?
For what purpose?
Is the area of any value to us?
Is the creek worth saving?
What can we do?
Do it!

Introductory activities

1 Prepare a chart showing what indigenous life might exist in the creek, use separate charts for plants and animals if desired.
2 Find how water is treated to make it safe for drinking. Warn about local creek water.
3 Discover food chains for freshwater and saltwater life.
4 Study water plants and their adaptations for this environment e.g. mangroves.
5 Collect and study life cycles of water animals e.g. mosquito, frog.

Field activities

1 Select a creek near your school e.g. Carroll, French's, Rocky, Gordon. Survey it prior to visit. Avoid Bare Creek below the garbage dump except for pollution studies. Trace selected creek from headwaters to its confluence with Middle Harbour Creek. Note access by track, fire trail etc.
2 Prepare a map showing important natural and man-made features (for juniors). Seniors should be able to add much information by observation, therefore their map should show basics only.
3 Distribute equipment: plastic bags and rubber bands, plastic containers with lids, hand lenses, thermometers, tape measures, 30 m tape, clinometer, depth line, scoop nets, trowels, cans open at both ends, cameras, food and drink etc. depending on duration of trip. Don't forget First Aid Kit.
4 On the way to the creek, don't avoid interesting situations concerning the environment. Impromptu discussions can be most valuable. This creek study should not be isolated, but rather integrated with other sub-units.

5 Children can be organised in groups to tackle particular problems e.g.
   a Water sampling and testing — froth test, hardness, temperature at different levels (surface water, middle water, bottom water).
   b Water plants — location e.g. on surface, in shallow water, in deep water.
   Creek side plants — height, circumference etc.
   Water animals — plankton, insects, etc.
   c Soil sampling — colour, texture, water test for separating soil particles of different sizes (trowel, can open at both ends for sampling).
   d Comparison of creek bottom from headwaters to confluence. What differences are there? Why?
   e Construct food chains based on observation and research.
   f man's impact on the creek — exotic intrusions.
   g How can we overcome problems?

N.B. Contrast salt and freshwater parts of the creek.

Worksheet ideas

Water plants					
Plant	Where found	Fresh/salt	Drawing (of those parts present)		
			Whole plant	Leaf	Flower/fruit

Water animals					
Animal	Where found	Type e.g. insect	Fresh/salt	Food	Drawing

Soil and rocks					
Type	Where found	Texture	Colour	In situ or transported	Sample (in plastic)

Water study

Take salt water samples and water temperature at:
1 Where we first came to the creek.
2 At points approximately 500m apart.
3 At the junction with Middle Harbour Creek.
4 Where it is obviously salty. How can you tell?

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	etc
Temperature						
Colour						
Soft / hard						
Fresh / salt						
Polluted (yes / no)						

Tests:
Test for detergent pollution by shaking water in plastic container.
Check for amount of suds.
Test for hardness by adding soap and shaking. Hard water will not lather.

Culminating activities

Culminating activities may be selected from the following list. The emphasis is on the children communicating their awareness of and concern for their environment to their peers and to the community.

1 Study interaction of sub-unit areas, with emphasis on human impact and through discussion devise a programme of park management.
2 Devise and implement a survey in the community along the lines suggested below.
3 Graph the results of the survey and then report to the community through the local newspaper, individual printed sheets or displays in the local shopping centre or library.
4 Plan a programme of remedial action within a local area of the park and put this into effect, possibly with community assistance.*
5 Compose and distribute leaflets to houses backing on to the park. These could:
   a Explain the problems of exotic infestations, dumping of soil, etc.,
   b Ask people for any experience they have in methods of combatting such infestations,
   c Seek co-operation of households in keeping the area of the park adjacent to their land in its natural state or in removing exotics already present,
   d Possibly offer some assistance.*
6 Write letters to the editors of local or other newspapers and to authorities responsible for park management.
7 Report in the school magazine or newsletter. If there is none at your school, here is an opportunity to start one. . .
8 Report on field trips and findings to the whole school through assemblies.
9 Submit outstanding work to the Gould League for possible publication or commendation.

*Removal of weeds where infestation is bad may well do more harm than good. It is more profitable to work in areas of scattered infestation where native plants have a chance to replace the weeds. Care should be taken to avoid trampling on small native plants in the vicinity.

Community Survey

We have been studying Davidson State Recreation Area. Would you please help us by answering the questions in this survey? Tick appropriate box(s).

1 Does your garden contain Australian natives? ☐ no
☐ some
☐ all
☐ don't know

2

What plant is this?.....

3 Do you know the difference between an exotic and a native plant?
☐ yes ☐ no

4 When you wash your car, where does the water go?
☐ sea
☐ creek
☐ sewerage system
☐ don't care
☐ don't know

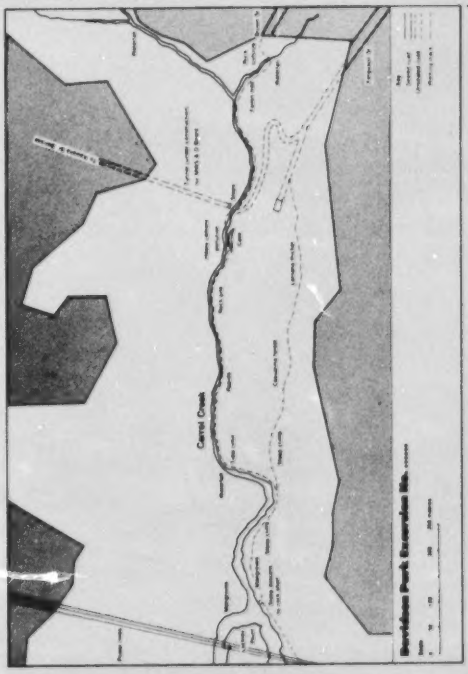
5 Do you feel imported plants are detrimental to our bush?
☐ yes ☐ no

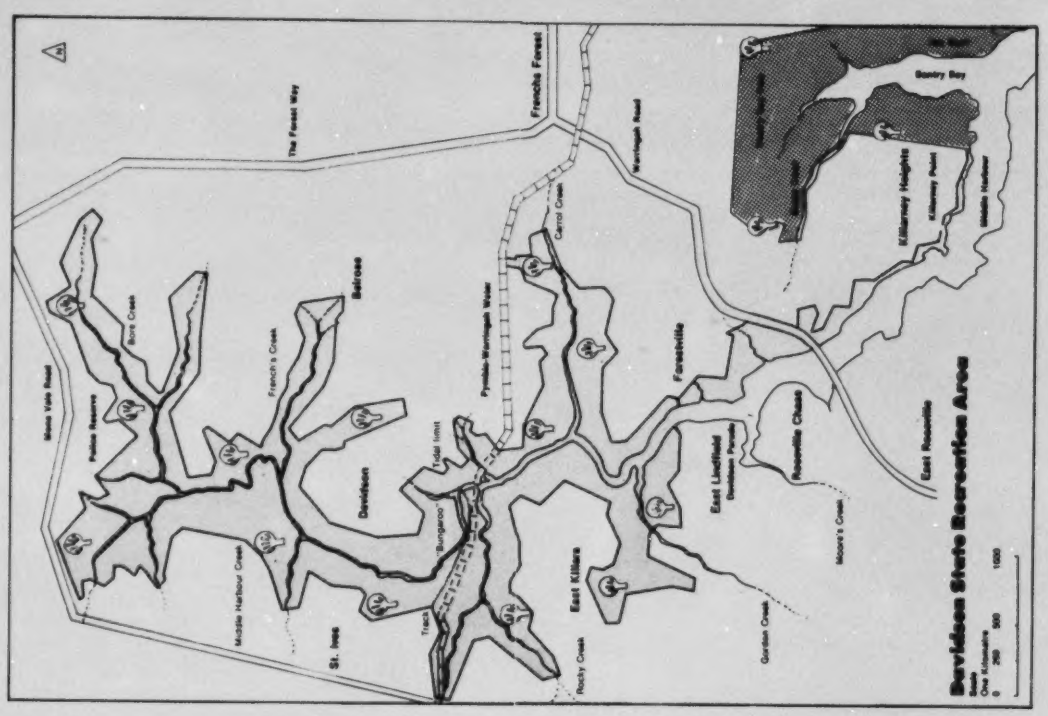
6 If you answered yes, do you destroy them? ☐ yes ☐ no
How?.....

7 Would you be prepared to help in regenerating areas of the park?
☐ yes ☐ no

8 How do you use the park? ☐ not at all
☐ for picnics
☐ swimming
☐ dumping of garbage
☐ horse riding
☐ trail / mini-bike riding
☐ getting rid of garden rubbish
☐ boating
☐ bush walking

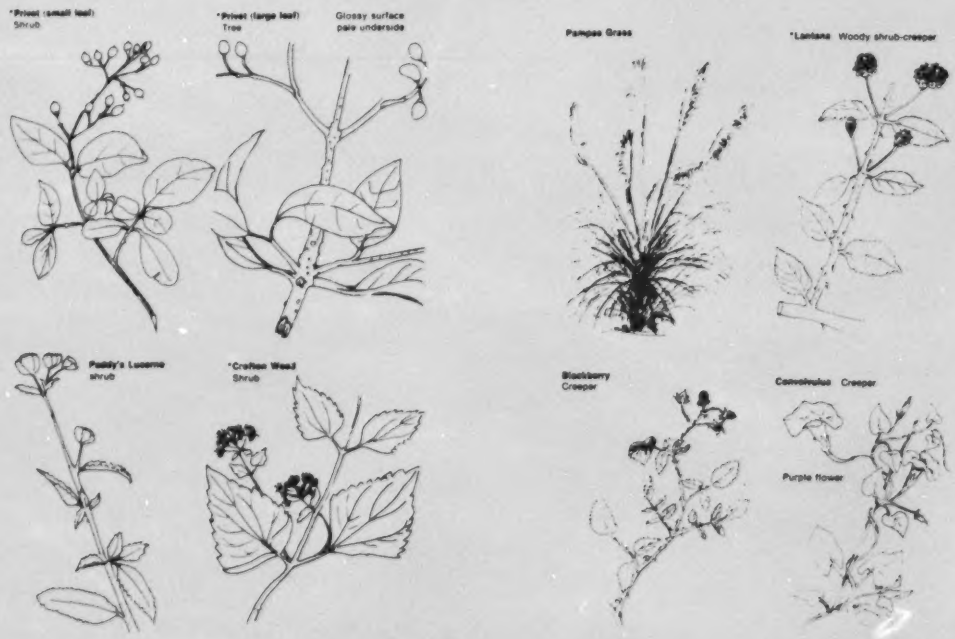
Some fieldsheets





Common exotic plants found in Davidson Park.

(Taken from *Barra Brui, St. Ives*) **Denotes most common*



Resources

References: methods and background information

Bradley, J. *Bush Regeneration*, The Mosman Parklands and Ashton Park Association.

Beshy, M.A. and Meyer, G. R. *Field Work in Animal Biology*, Sydney: McGraw-Hill, revised ed. 1966.

Champion, S. and G. *Forest History*, 1977.

N.Z. Dept. of Education. Curriculum Development Unit.

Science Resource Units: Infants — Standard 4.

e.g. *Scrub Area*
Waste Area
Native Bush
The Pond
Estuary
Behaviour of Slaters
Bugs and Beetles

Schools Council, *Science 5/13*, London: Macdonald Educational.

Minibeasts
Trees
Using the Environment
1 *Early Explorations*
2 *Investigations Part 1 Part 2*
3 *Tackling Problems Part 1 Part 2*
4 *Ways and Means*

The Wildlife Committee, *Bantry Bay: The Case for Conservation*, Upper Middle Harbour Conservation Society.

Other sources of information and/or publications

Ranger, Davidson State Recreation Area: Mr. Max Pritchard
Park headquarters: Ferguson Street, Forestville 2087
Phone 451-3479

Davidson State Recreation Area Trust
Address enquiries to Mr. John Whitehouse,
85 Grosvenor Road, Lindfield 2070

Upper Middle Harbour Conservation Society
Address enquiries to Mr. George Champion
14 Tipperary Avnue, Killarney Heights 207
Phone 451-1686

Department of Lands
Maps, aerial photographs

Gould League of N.S.W.
Booklets e.g.
Environmental Education: Fieldwork
Environmental Nature Trail, Stations and Activities.

Forestry Commission of N.S.W.
Pamphlets e.g.
Common Insect Pests of Trees
The Eucalypts
Trees of the Sydney Area.

National Parks and Wildlife Service
Posters of wildflowers, birds, reptiles etc.
Information leaflets on native animals.
Pamphlets on feral animals.

Audio-visual Aids

Teaching Resources Unit, N.S.W. Department of Education
Filmstrips e.g.
Australian Wildflowers
Looking Around Us in the Bush
Adaptations of Flowering Plants (Parts 1 and 2)

Kits e.g.
Some Wildflowers of Australia
Birds of Australia

Frauca H. and Roberts, J. *Australian Insects: Science Pictures*. Jacaranda Press, 1977.

Frauca, H. and Roberts, J. *Australian Fauna & the Environment: Science Pictures*. Jacaranda Press, 1977.

AN URBAN FIELD STUDY CENTRE

K. A. Enchelmaier and J. M. Veacock

PREAMBLE

Using their experiences with the Fortitude Valley Field Study Centre in Queensland, the authors of this article emphasise the importance of urban studies in any program of environmental education before describing the three main approaches to urban study used by teachers in Brisbane. Following a brief outline of the history of operation of the Fortitude Valley centre, they identify the major criteria which should be satisfied when selecting venues for urban study. Their observations therefore provide an important complement to the two other contributions to this section.

INTRODUCTION

Emphasis on studies related to the environment is a recent development. But it is unfortunate that the association of environmental studies with field trips and with nature studies has resulted in environmental education being linked with the natural environment. This is particularly so when we consider that one of the greatest influences on children is their immediate, local environment and that the majority of Australian children live in urban areas. Even for the small minority of children who do not live in urban areas there is a need to let them experience the urban environment at first hand and to develop their own ideas, attitudes and values about it.

In the past, investigations in urban areas have tended to be subject specific. For example, geography students in surveying the fringe area of the city may only have recorded the land use on each allotment they encountered. If a true picture of that environment is to be obtained, the investigation would also include the following aspects:

- Historical background of the area.
- Relief, vegetation, soil characteristics.
- Characteristics of the built features: planning and architecture.
- Present political, social, economic and cultural influences.
- Intrusions into the area—noise, traffic, people, smoke or fumes.
- The independence or dependence of the area.
- Natural or imposed boundaries—i.e. town planning zones.
- Aesthetic considerations.

Irrespective of whether the investigations are to be carried out by primary or secondary level students, there are certain skills and knowledge necessary for the interpretation and investigation of the urban area. It is therefore useful to have someone who can act as interpreter of the area and be responsible, in the main, for the preparation of programs, and the development of urban study techniques, as well as to act as collector and distributor of relevant resource materials. These comments provide justification for the appointment of a field studies officer who could assist schools to prepare programs in

environmental education and conduct the field study for a group visiting an urban studies venue from a base in a school, public building, historic building or a caravan which could be moved from one area to another. Alternatively the responsibilities of a field studies officer could be undertaken by a group of teachers working from one centre or from their own schools.

The establishment of such a centre does not automatically satisfy the requirements for a school's environmental education program, as the urban study centre and field visits for studies in an urban area can only be *a part* of the total program of the school and must be supported with numerous other experiences both within and outside the classroom. It is necessary, therefore, for the study centre to provide flexible programs so that they complement the activities of the school and suit the approach to environmental education adopted by the school or class teacher.

APPROACHES TO ENVIRONMENTAL EDUCATION IN URBAN AREAS

An urban area can be studied from a number of directions. In Brisbane the three approaches discussed here are used widely by teachers.

Sensory Experience Approach

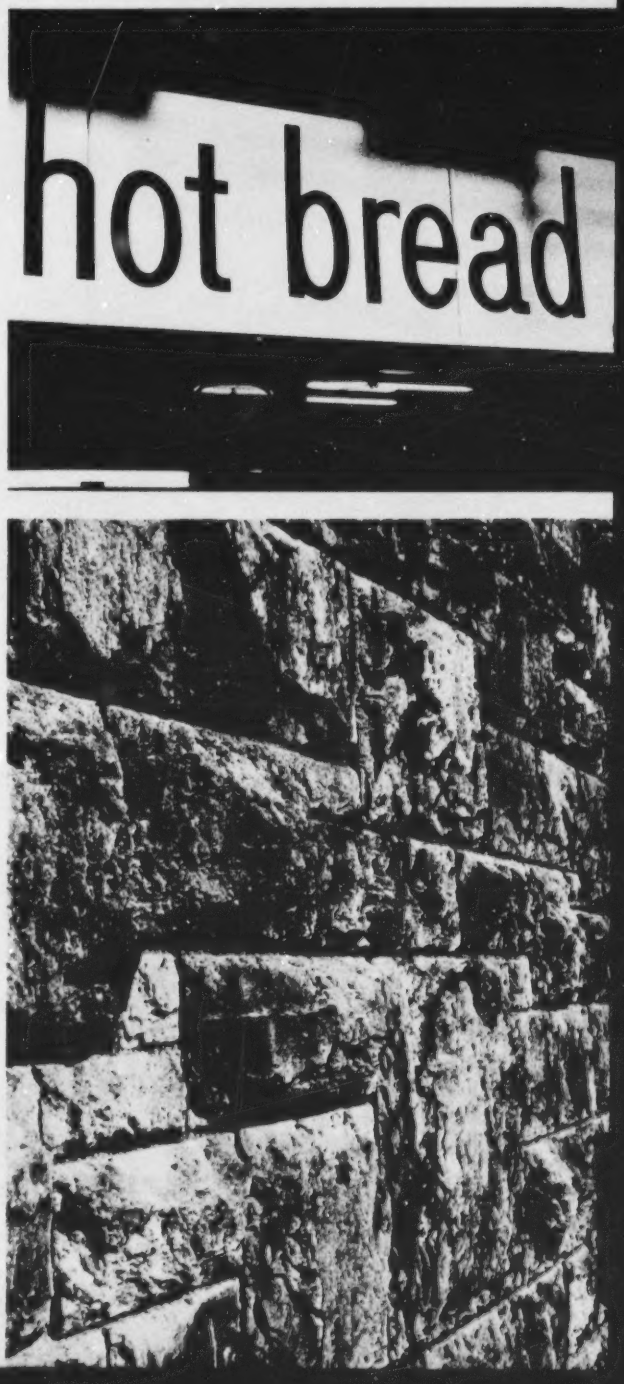
The aim of this approach is to encourage students to gain an appreciation of an area through the use of as many of their senses as possible, and not to concentrate on gathering factual data on, or about, the area. This cannot be considered as being a natural reaction of a student, for, in many children, the skills necessary for such an investigation are not well developed. An integral part of the approach, therefore, is the development of sensory awareness skills.

The use of a blindfold is an effective way to do this for the sense of sight is the one by which we gain most of our initial information in a new area. It is therefore the obvious sense to 'remove' when a *total* sensory awareness is required. When using blindfolds, ensure that they are in place before children arrive in an area they are to explore with their senses or they will be guided in their exploration by what they saw prior to the blindfold being put in place. Have the children explore surfaces with their hands and listen for sounds which will indicate other components of the area such as birds or road noises. In particular, make them aware of smells which can be associated with particular features such as fresh bread, flowers in a garden or a nearby factory. It is important to record children's responses as the explore. A tape recorder is valuable for this purpose.

Visual awareness activities should also be used. These should be designed to focus the students' attention on specific details within the visually crowded townscape—details like brick and stone patterns, carvings, and colours.

When using a sensory experience approach select an area which contains a wide variety of sensory stimuli.

Areas providing a wide range of smells, sounds and textures should be used when adopting a sensory experience approach.



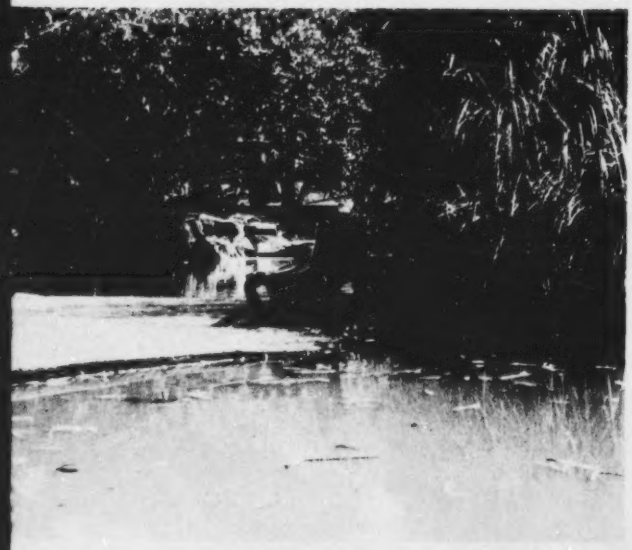
An Investigation Approach

With this approach it is usual for the study to be centred in an area defined by location, or by a specific activity such as a particular land use zone, like the school's local environment or the central business district of the city, or its transition zone, or a suburban residential area.

This approach may be implemented as a five step process:

(i) *an awareness of the components of the area:* The components are the individual elements of that environment including man, the natural and built features, and the social, political, economic, cultural and aesthetic factors.

Elements relating to commerce, street furniture, traffic and people can be identified within the commercial area.



(ii) *an understanding of how the components fit into inter-related systems:* In this step the components identified in (i) are categorised by the students into common groups or systems. These could be 'social factors' (or any other of the above groups), transport systems, public facilities, etc. It is anticipated that during the group discussions when the components are being grouped, the students will gain an appreciation of the complexity of the urban systems and how components can be part of a number of different systems.

(iii) *an appreciation of the effects of one system on another, particularly the effect of man on his surroundings, and the effects of his surrounds on him:* The students could monitor the effects of past and recent changes on their study area and maybe design a change and predict the effect caused, for example, by the closure of a road through a business area or the construction of a factory near a residential area. In trying to assess the effect of the area on people, interviews with the residents or users of the area could be undertaken. The children can rate the area and the feelings it inspires subjectively. The area portrayed in Plate 46 is appropriate for such an activity.

(iv) *become concerned with the quality of the urban environment and the quality of life within urban areas:* It is first necessary for the students to determine some criteria for environmental evaluation and some method of determining what is meant by both 'environmental quality' and 'quality of life'.

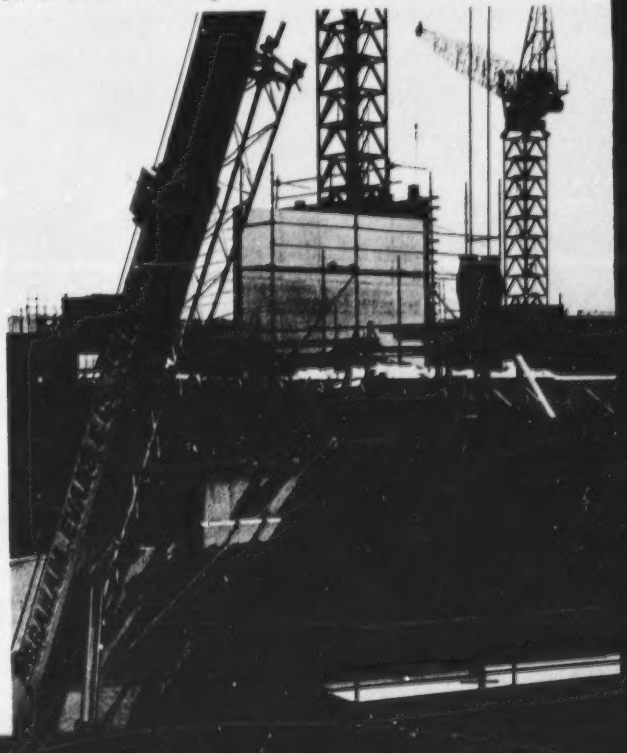
(v) *formulate policies which would improve the total environment, and become actively involved in the implementation of those policies:* The techniques of re-development, restoration and preservation could be considered along with avenues of initiating action—particularly at the local community level. As a result of this step, the students may undertake a project of environmental improvement within their own schoolgrounds or local area.

A Topic Approach

As the name suggests the topic or concept approach involves an investigation of specified topics or concepts related to an environment, for example 'city waste', 'urbanisation', 'change'. It is common to find this approach used when knowledge is the desired major outcome or when a topic is set for individual research the outcome may not be predetermined. A broad investigation should be planned, however, to ensure that the skills, attitudes, values and behaviours as well as the knowledge intrinsic to programs in environmental education are developed.

Areas such as these are good locations for an area investigation approach. Here the dominant land use (residential) and associated facilities is being affected by the intrusion of high-rise professional office development.

Building sites provide scope for investigations of the different types of work people do, the machinery they use, the techniques of building, noise levels, and, above all, for studies of change.



The actual techniques for implementing this approach do not differ greatly from those used in the previous approaches. Surveys play an important part of topic studies provided that the material collected is then discussed so that conclusions can be drawn. The conclusions or generalisations made may then be subjected to further test in the classroom or field situation.

When looking at a topic or concept it is important to examine it within the total content of the environment for many of the other factors within the area have a very definite effect on causing that 'topic' to be as it is—for example, noise levels are affected by topography, distances between buildings, road and wall surfaces as well as the obvious types of industries and transport within the area.

AN URBAN FIELD STUDY CENTRE

For the past four years an urban field study centre has been operating in Brisbane. Initially a work base was established in the Fortitude Valley State School (hence the name Fortitude Valley Field Study Centre) which is located on the fringe of the city area. The venues utilised for field studies comprised the urban transitional zone of Fortitude Valley and the central business district and neighbouring areas of the city. At present a resource centre is being developed closer to the city centre. This will give students and teachers better access to the printed audio-visual resources and display material held by the centre.

The role of the field study centre is 'to advise and assist schools in the development and implementation of their own programs of environmental education in the urban area as well as to provide specialised activities and field investigations whereby students can be led to:

- understand the past and its effects on our present environment and way of life
- appreciate the present—how man, and what he has structured—affect one another
- take an active part in planning our future so that our ways of life can be in tune with sound environmental thinking' (from *Fortitude Valley Field Study Centre Teachers' Information).*

This is fulfilled in two main ways. Two staff from the field studies centre are available to assist teachers in their own schools, conduct in-service seminars on urban studies, and assist and advise teachers in a district in the preparation of programs to be used by the surrounding schools. The activities prepared for use in the study centre are available for modification to suit the local conditions. Secondly, staff prepare and conduct field experiences with the study venues.

The Fortitude Valley Field Study Centre has no residential facilities so visits by schools are on a daily basis, although some groups have undertaken two or three day studies. Schools from Brisbane and the surrounding areas contact the study centre and book a field visit. After discussion between the study officers and the class teachers, a program for the day is prepared. Thorough preparation is essential before any excursion and specific guidelines are supplied by the study centre. The visit to the centre includes outdoor activities conducted by the staff and, on occasions, introductory or enrichment activities at the centre using the displays and resources there.

Following the field trip the class teacher is encouraged to participate in the interpretation of field observations and recordings, undertake further research and develop concepts and skills which can be applied in other field activities.

In field investigations, particularly in busy urban areas, best results have been obtained by using small work groups. Two staff are stationed at the study centre to allow the class teacher to observe the field techniques, the class group being divided into two sections. Teachers who have visited the centre previously and are familiar with the study activities can also take a group thus reducing the size of the groups even further. By having small groups, all the students can be encouraged to participate more fully and supervision is simplified. Small groups in city shopping areas do not cause the same pedestrian problems as a large group.

During the four years of the centre's operation the position of work sheets and the role of the staff have become defined. Basic to all programs has been the desire to record data, feelings and attitudes while in the field. This has been achieved by the use of photography, tape recorders and specially designed work sheets or field guides. Photographing elements of an area for review or classification activities and tape recordings of children's responses, interviews, and noises, are both aspects of recording.

In the preparation of worksheets and field guides, it is necessary to bear the following points in mind:

- The completion of a sheet should remain secondary to the experience itself. We have seen instances where the worksheet has taken over the excursion so that the

answering of questions has excluded the student from actually experiencing that urban area.

- The sheet must allow for the recording of individual feelings and attitudes and not just factual answers.

Question and answer worksheets are not the only way of preparing a field activity. For example, a page of photographs or sketches can be used for a visual awareness activity while a kit of old photos, newspaper cuttings, sketches, taped commentaries, and so on can provide for a study activity on say 'change'.

The study centre has prepared a variety of different types of worksheets ranging from self-guiding booklets and study kits to single worksheets and blank maps. Not all groups use prepared worksheets. Some use material produced by the class teacher and others use no worksheets at all.

Programs prepared by the study centre include aspects of history, cultural and social factors, urbanisation, area investigations (i.e. residential environment, a commercial centre, precinct studies), skill development (i.e. mapping and survey skills—sensory awareness).

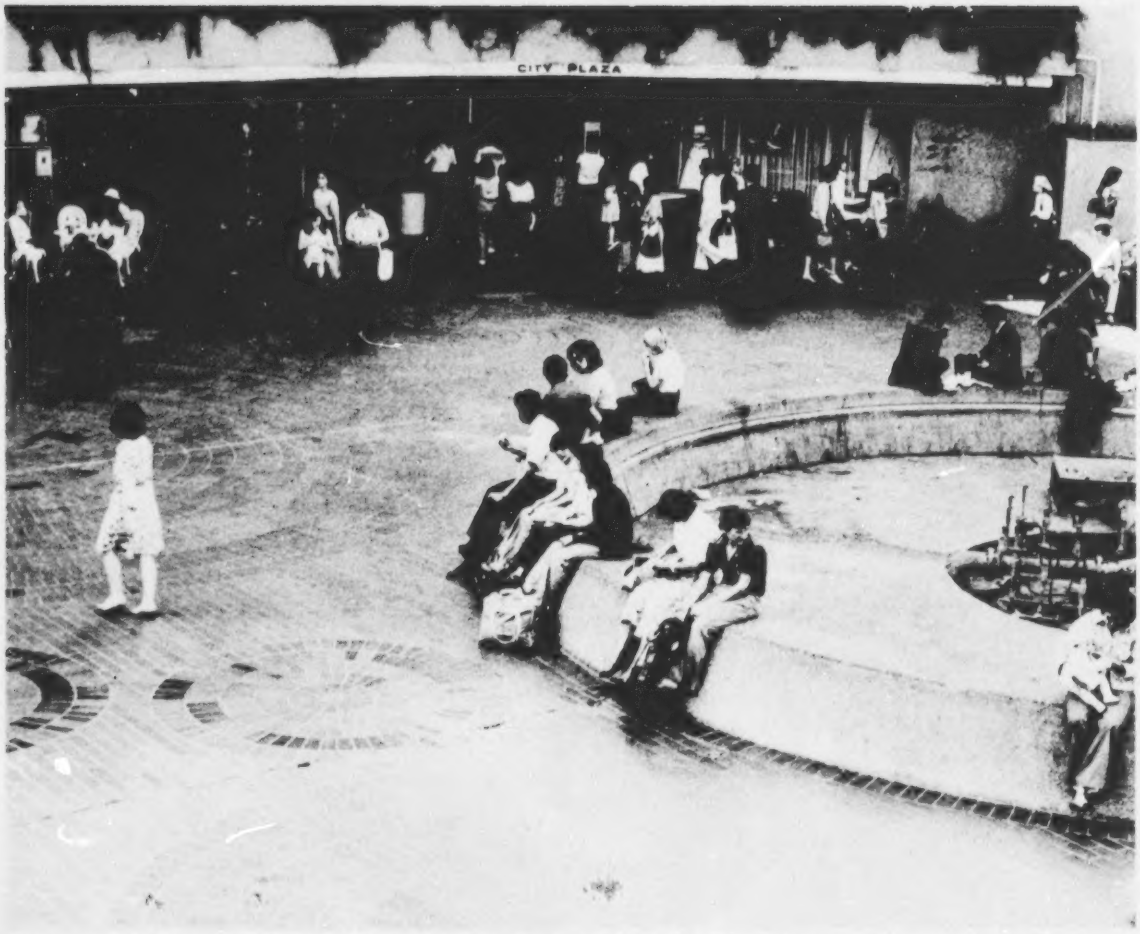
When worksheets are used the teacher should guide the group discussion so that the students can complete the required activities in the light of new ideas and understandings they have gained. If values or attitudes are to be recorded, these too should be the students'. The potential for fulfilling the objectives of an environmental education program is totally dependent on the way in which the teacher conducts the activities in the field situation.

Another responsibility of the teacher is the supervision and safety of the group. This is no different to the classroom situation except maybe the nature of the 'classroom'. Outside the school there are more potential danger situations. The teacher must be aware of these situations and ensure that adequate safety precautions are taken.

SITES FOR URBAN STUDIES

Any urban area can be utilised for some type of environmental education activity. However, the full range of urban experiences is not usually available within easy access of a school and it is necessary for the group to visit a different area to complete their studies. The selection of this area is very important as consideration of the factors which influenced the selection of the venue for the Brisbane Field Study Centre demonstrate.

Vantage points can provide for surveys of land use patterns, transport corridors, and building types—provided that adequate safety rails are present.



Plaza areas can provide public facilities, somewhere for lunch, and quiet corners for group discussions, as well as being a venue from which to examine shopper behaviour, people movement, and the workings of a commerical area.

- The area itself provided for a wide range of urban experiences: Both work bases are located within the transitional zone of the city and are surrounded by areas of houses, shops, industries, government function areas, recreational and public facilities and places of historical significance. Urban changes and transport effects can be seen. All of the features are within walking distance from the study bases.
- An adequate 'home base' was available: The two venues have different types of work bases. In Fortitude Valley the base is a functioning school in which a room is used by the study centre for office and store. In addition, the school's library and audio-visual room are available for use by a visiting group. The city fringe base is a larger study centre complex and includes an office for staff preparation and administration duties, a room where audio-visuals can be shown during the day, a large display and work room for visiting groups to use, a resources area, a storeroom/ darkroom and toilet facilities.
- The venues are easily accessible: Both bases can be reached by public transport. Limited parking is also available.
- The areas are generally hazard free: Throughout the venues are well defined pedestrian areas with controlled road crossings. Danger spots, notably road and railway bridges and embankments, are adequately fenced and potentially hazardous industries such as those producing explosive gases or fluids, are absent.
- Field facilities are present: Located within the study areas are public toilets, areas to eat (parks) and places providing shade and shelter from rain.

SECTION

4

LIVING THINGS

LIVING THINGS

INTRODUCTION

The value of using plants and animals to develop a range of learning skills and an empathy with living things is amply demonstrated in the three items in this section.

Mice and Eucalypts became the focus for a Year 3 class in a Brisbane school over most of a year. The step by step development of the children's skills is outlined with examples of the activities cards and the resultant work. The progression from a highly structured situation to an open-ended one would make many a teacher envious of the success that is evident in this description.

Another approach to living things, this time vegetables, is contained on the video *Gardenshare* produced by Audrey Windram. This is a sensitive introduction to school/community gardening which aims to encourage people to 'have a go'. Problems are mentioned but it is the possibilities that are given the greatest coverage with the film moving from a treatment of a community garden to normal and special school gardens. Copies of the videotape are available from the Curriculum Development Centre, Canberra.

The use of living things, particularly animals, across the curriculum in language, mathematics, social studies, science, art, music, drama and physical education is advocated in the last manuscript in this publication. A framework for each subject area is supplemented by an imaginative array of activities involving animals inside and outside the classroom.

Guidelines for the care and maintenance of the animals or plants are not given here for the information can be found in the references given and particularly in the recently released series of pamphlets by George Warren of Burwood State College, Victoria. The well-being of plants and animals is nevertheless essential to the success of any program aimed at developing empathy for living things. Children are quick to observe the double standards inherent in a teacher who encourages concern for living things during a lesson but forgets to ensure the classroom animals are looked after over a long weekend.

CURRICULUM DEVELOPMENT IN ENVIRONMENTAL EDUCATION

An Approach at Year 3 Level

Ron Tooth

PREAMBLE

A program of three environmentally based units of work was developed at a Brisbane primary school for a Year 3 class. For the teacher involved, these units led to a new approach to teaching which incorporated both education about and education for the environment across many subject areas.

INTRODUCTION

The essential aim of a meaningful environmental education program should be to produce individuals capable of making decisions concerning environmental quality. In order to make these decisions, I believe three things are first required:

- An understanding of the environment, in its totality as well as its component parts.
- Skills for examining and analysing the environment (both the biophysical and social).
- A feeling of concern for the environment.

I decided to approach the development of these three areas by focusing on living aspects of the child's natural environment. To do this I developed a program based on three units of work, which included allowing the children to experience the local bush and wildlife. The units, 'Introductory Activities', 'Eucalypt Activities' and 'Mice Activities' aimed:

- to develop the child's ability to observe phenomena in his environment
- to develop a number of other process skills, namely
  - —recording
  - —classifying
  - —inferring
  - —hypothesising
  - —experimenting
  - —interpreting
- to develop the child's understanding of plants and animals
- to allow the child to experience a subject-integrated approach to learning
- to encourage the child to develop a feeling of concern for his total environment.

How high is that tree?

IMPLEMENTING THE PROGRAM

Rationale for the Approach

Because process skills enable children to seek out and answer questions for themselves, it became evident to me that these skills are a necessary prerequisite to the development of individuals who are sensitised to the world in which they live.

The most fundamental of all processes is observation and so the initial emphasis in these units is on observation and the collection of information using all the senses. To this end the children were encouraged to study their immediate environment and search out its finer details. Anything that was easily accessible became the focus of observation with a variety of information being collected by approaching objects from different perspectives. The children discovered a 'gold-mine' of learning resources in the soil, rocks, plants and animals that they came across both inside and outside the classroom. In this way, a concern for developing process skills led to an integrated approach to teaching and learning.

An example may help to illustrate this approach and explain the procedure. In observing a tree, a child collects information which can be used and expressed in many ways. Value judgements as well as 'objective' observations may be involved.

> 'My tree is about ten metres high with dark furrowed bark.'
>
> 'This eucalypt has a G.B.H. of 53cm. The bark is smooth and spotted.'
>
> 'The leaves droop down like scary fingers and part in the breeze.'
>
> 'My tree is beautiful and green. It makes me feel calm and quiet.'
>
> 'Eucalypt trees are swaying
> rolling and bending
> shaking and trembling
> waving and creaking
> buffeted by the furious wind.'

The tree can be the integrating point for various curriculum areas, as well as providing direct concrete experiences. Instead of studying mathematics, science, language arts, social studies, music or drama as totally separate subject areas, we can have one focal point of study that is approached from these different angles. Of course there will be aspects of each that must be taught in isolation, but at least this approach solves three basic problems in curriculum planning.

Overcoming Problems in Curriculum Planning

- *Provision of concrete learning experiences:* Much educational research emphasises the need to provide direct, concrete learning experiences. I have found concrete experiences to be necessary, although abstractions also need to be considered, even at Year 3 level. It is dangerous to fall into the trap of thinking that young children cannot use abstractions. They need to be encouraged to use abstract thought but always based upon concrete and meaningful experiences. There can be an interaction and unity between the concrete and the abstract. These concrete experiences can be easily provided by the many aspects of the world that surround us every day. Well established skills, learned through direct experiences, provide the base for creativity and understanding.

- *Integration of subject matter:* The destructive notion that each subject area is unrelated to the others can be broken down so that learning is seen as a unified activity. For example, as the children touched and looked at the tree they collected vocabulary for creative writing:

> 'The Eucalypt trees swayed in the furious wind and the green leaves rustled and trembled in the madness. It sounded like many voices all talking at once. My face and hands felt cold and fresh and my nose was runny.—by Jean.

WIND IN THE EUCALYPTS

I walked,
red nose and cheeks,
wind, cold on my skin
chilly and numb
fresh and crisp
watery eyes and goosebumps
wind, cutting into my skin
penetrating deep to my bones.
I look up
Eucalypt trees are swaying
rolling and bending
shaking and trembling
waving and creaking
buffeted by the furious wind.

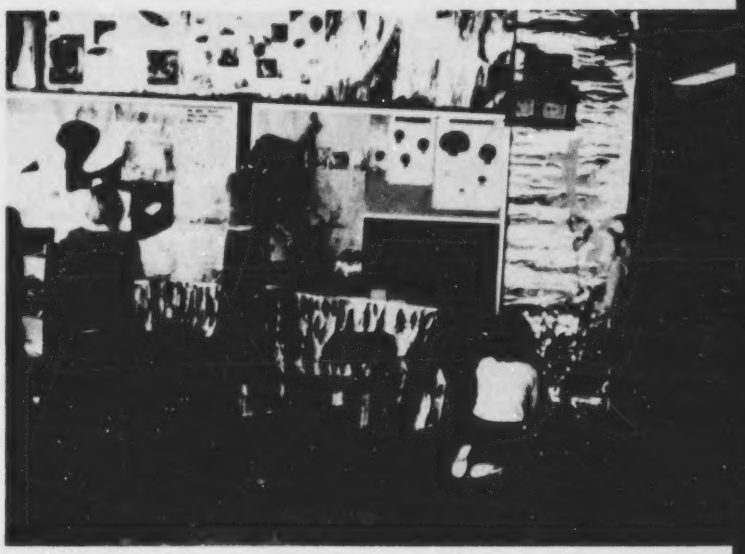
Written by
Year 3, 1978

Writing such as this was typed into language experience booklets which were then placed in the reading corner of the classroom.

The tree was the stimulus for creative dance, drama and verbal dynamics. Much of the work produced was taped and used at the listening post and in speech development. The tree also provided the focus for measurement activities and graphing activities. Leaf area and width of trunk were compared to other local trees. Social implications concerning the value and use of trees emerged:

> 'Why did the Bulldozer kill the trees? Its neck was yellow and strong. It growled and snorted and crashed the Eucalypts to the ground.'—by Geoffrey.

From this statement a discussion on the clearing of forests followed.



We began to create an environment.

- *Lack of resources:* I believe that most primary school work should be focused on real objects that are readily available and interesting for the children. This can be achieved by making the existing social and physical environments the focus of attention. At the same time the problem of limited resources is easily overcome by using the children, the room, the trees, the rocks, the soil, the plants and the animals that are there. Ordinary things that children bring to school such as marbles, yo-yo's, toys, clothing, flowers, shells, can all be used. These objects provide an almost inexhaustable source of materials. They can be weighed, measured and compared; as well as talked about, written about, and sketched. Thus everyday things can provide a base for drama, poetry, writing and speaking.

The Classroom Environment

It is also important to consider how the classroom environment may be changed to fit in with a particular theme. We decided to create an environment that would put us in a particular mood. A eucalypt forest with branches and leaves hanging from the walls and ceilings was constructed in one corner of the room. We used silver insulation paper provided by a local builder. Charts, poems, stories and other work were displayed around the room. The children were involved in handling the mice, caring for the seedlings, and feeling the atmosphere created. The children spoke about the environment:

> '. . . It's a good idea to decorate the room for the subject . . . you get more idea of what you're doing . . . and you think better and have more ideas . . .'

> '. . . In our room with all the colours and that, you feel sort of happy and you feel at home . . .'

THE ENVIRONMENTAL UNITS

Overview of the Activities

- *Introductory Activities:* A series of activities designed to develop the ability to observe and collect information using both general and precise description

- *Eucalypt Activities*

- *Mice Activities:* Both the Eucalypt and Mice activities consisted of two parts

  —Focus Activities—These were designed to sensitise the children to the topic of study and to develop vocabulary and basic concepts and skills needed to use the cards effectively.

  —Activity and Research Cards: The activity cards introduced tasks and problems that the children in concrete situations. The research cards gave practice in some basic research techniques.

The time allocation and sequencing for each of these activities is outlined in the following table.

TIME AND SEQUENCE TABLE FOR PROGRAM

Week	Activity	Organisation	Activity	Organisation
1-3	Introductory Activities	Whole class	Graph Kit	Small groups
5-9	Eucalypt Focus Activities	Whole class	Graph Kit	Small groups
9-13	1 Eucalypt Activity Cards 2 Eucalypt Research Cards 3 Graph Kit	Small groups rotated	Mice Focus	Whole class
13-17	1 Eucalypt Activity Cards 2 Eucalypt and Mice Research Cards 3 Mice Activity Cards	Small groups rotated		
17-21	Complete Mice Activity Cards	Small groups		
22-26	Presentation and discussion of work covered during program	Whole class		

Intergrating the Units Within the Year 3 Curriculum

Use of the activity and research cards was restricted to a one and a half hour time slot usually in the middle of each day prior to lunch. In addition there were other times when we walked in the nearby eucalypt forest sketching and discussing what we found. Drama lessons were taken and the children wrote stories and poems.

WALK IN THE FOREST

Started
Walked slowly
Began to climb
track
Stones and dust
Steep and rough
loose slipping gravel
track
winds and curls
full of ditches
many fallen trees
We trudged
stamped and stumbled
slid and skidded
tripped and tumbled
and fell.

by Year 3, 1978

While the eucalypt and mice units were in operation I attempted to make them the unifying theme for all the subject areas. This means that where possible we used themes in creative writing, drama, maths, social studies, and art. An example may make this clearer. I was introducing the concepts of area and perimeter. I encouraged the children to gather fallen eucalypt leaves, and then set them the task of finding the distance around the outside of each. After allowing them to explore the possibilities for some time, I drew the threads together into an introductory lesson on perimeter. Thus, the eucalypts became the means by which a mathematical concept was established. I am not suggesting that all activities were centred around the two themes, but only that they constituted a major focus for as many subject areas as possible.

Drama sequences flowed out of our interaction with the living environment. The children became eucalypt trees and moved with the wind.

Outline of Units

Introductory Activities

One morning a bulldozer began ripping through the bush just outside the room. The roar of the engine put an end to the lesson I was attempting to give and so we moved outside. We watched the huge machine pushing its way forward into the thick undergrowth. After observing for ten minutes we went back to the class and experimented with constructing an information collecting grid. The bulldozer was subdivided into as many parts as possible. Each child produced a grid and then we spent an hour following and watching the bulldozer. Information was collected about each part, its colour, shape, size, sounds it produced, etc. All this was pooled onto one large chart in the classroom. Later in the day, when the machine was silent, I organised a meeting with the driver. He allowed the children to climb over the machine, measuring the different parts to collect precise information concerning length, width, thickness, etc. By 2.00 p.m. we had a detailed and comprehensive description of the bulldozer.

This information chart became the *base* for drama, verbal dynamics, word analysis, poetry and story writing, art and craft activities. The children were introduced to new words and these activities in a meaningful context.

In describing the bulldozer an attempt was made to distinguish between what I termed 'general' and 'precise' description. These two types of description became evident in collecting information. We derived an operational definition for each type and the children were encouraged to use both types as the following examples indicate:

- *General Description* (information collected via senses *unaided* by instruments of measurement):

Bulldozer	General Description
scoop	*long yellow, hinged solid, gouging, shook scraped*
tread	*rattling shaking, metallic jointed, wobbling dirty*
wheels	*round squeaking, rattling thick, turning muddy, spun*

- *Precise Description* (information collected by using instruments of measurement):

Bulldozer	Length		Width		Thickness		Mass	
	Guess	Real	Guess	Real	Guess	Real	Guess	Real
Scoop	2m	1.5m	1m	2m	70mm	60mm	100kg	—
Tread	5m	3m	400mm	500mm	60mm	70mm	70kg	—
Wheels	400mm	300mm	350mm	400mm	—	—	50kg	—

Thus the children were introduced to the idea of observation. During that month we used anything that happened to provoke interest at the time, such as thunderstorms and stray dogs, as a focus of observation. Through the frequency of this approach the children also were given a great deal of practice in using the skill of 'information collection'. The children were encouraged to develop their own methods of information collection and these were analysed critically by the whole group. Through discussion and specific lessons a general format was developed which involved the construction of a grid for listing the parts of the object under study. This was not imposed rigidly on the children, however most used it.

Opportunities were given to allow precise description to take place. This approach allowed the introduction of measuring instruments and set them in a meaningful context. As well as using rulers, tapes, and other units in the measurement of the bulldozer's parts, I gave specific lessons to teach the introduce 'Practice Kits' which I had developed. Through the kits on measurement the children were given a great deal of practice using rulers, scales and other measurement devices, while the graph kit provided guidance and practice in the recording of their information in simple record sheets and bar graphs. Emphasis was placed on first predicting ('Guess') and then measuring ('Real'), as outlined in the previous example.

Graphing is helpful way of organising information. Part of the time was spent using the graph kit. It gave needed practice in graphing skills.

Eucalypts

Focus Activities

The focusing activities consisted of a number of short excursions into the neighbouring bushland. On these walks we collected from the ground a class sample of leaves, or bark, or eucalypt buds or flowers. These were progressively brought back to the room where the children created their own classification systems. In one session we isolated as a class, the possibilities of shape, size, length, colour, width, area and texture as criteria for classification. The leaves, bark and flowers that were collected also became the objects of observation. The information collected, especially the precise data (length, width, area, etc.) was used as the basis for the classifications mentioned above. The children counted veins and stamens, measured perimeters, and calculated areas, wrote poems and short descriptions about the delicate flowers and dropping leaves.

> 'The flowers were yellow and smelt like honey. They had lots of feathery pieces with delicate bits on them.'
>
> 'I crumpled my leaf and it smelt like lemon.'
>
> 'My eucalypt leaves were long and skinny. One had a perimeter of 160mm. Its area was 1050mm².'

As part of the activities the children were introduced to sketching. This was then applied on a very successful excursion up the slope of a hill at the back of the school. We walked and looked, and talked and sketched. During the excursion the following interesting facts were isolated by observation:

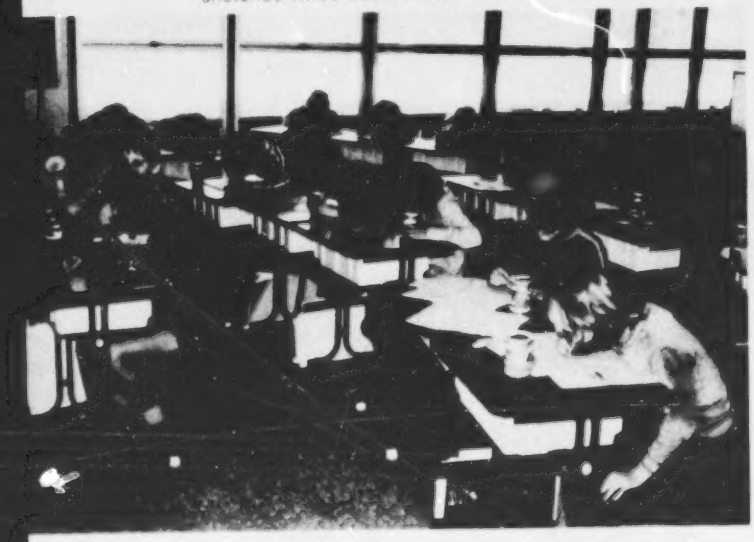
Eucalypts have:

- leaves that hang down
- leaves that bunch at the ends of branches
- most of their branches visible
- branches that start half way up the tree
- different barks
- a skinny and twisted look.

It became that this particular activity was an excellent way of making the children really *look* at what was there.

In conjunction with these class activities we propagated about two hundred Lemon Scented gums in trays. I involved the children as much as possible with the preparation of these trays and we discussed the best method for sowing the seeds. Soil was collected nearby, mixed with peat moss, and the seeds planted. We waited patiently for the next four weeks and it was in the midst of great excitement that the children noted the first plants pushing their way into view. When the seedlings were one week old they were transplanted into small plastic cups. Each child had his own plant and twice each week made a detailed sketch of his plant. Changes that occurred were discussed. As the weeks passed I noted a marked increase in the amount of detail recorded in the children's drawings of their plant. Those trees that survived were taken home to be planted where the children continued to take care of them.

Each child is busy keeping the weekly record of changes in the young seedlings. The baby eucalypts were sketched twice each week.



Chris carefully sketches his baby eucalypt.

Research and Activity Cards

When the focus activities were completed I introduced the Eucalypt cards. This material consists of two groups with twelve cards in each group (see sample cards). The first group were research activities on Eucalypts in Queensland and Australia, and the second are activities involving the Eucalypts in and near the school grounds. Each set of cards has an accompanying booklet for recording information. The research cards are fairly simple, and provide practice in short and long answers, choosing of key words, isolation of main ideas, and the presentation of information. The tree activity cards involve the children in observing, recording, interpreting, and presenting information about local eucalypts.

None of the cards, especially the eucalypt activity cards, are designed to replace the teacher. They are used as teaching aids, to set problems, promote discussion, and suggest possible solutions. The cards are of most value when there is someone to ask the right questions at the right moment, and thus guide the children in helpful directions.

The twenty-five children in the class worked in three groups for this section of the program over four weeks. Each group was of mixed ability, allowing the more competent students to assist the slower children when necessary. One group worked on the eucalypt activity cards, one on the research cards and the third on a graph kit which had been introduced at the beginning of the program. Because of previous lessons and practice in the techniques associated with using research cards, the children working on these cards did not require much assistance. The same applied to those on the graph kit. However, the eucalypt activity cards were slightly different. They required new skills to be learned, problems to be solved and new concepts with which to grapple. Therefore I situated myself with this group, while rostered mothers (usually two) acted in a supervisory capacity with the other two activities. The cards were given specific time slots each day. We worked a one and a half-hour cycle, with half an hour spent on each activity.

Mice

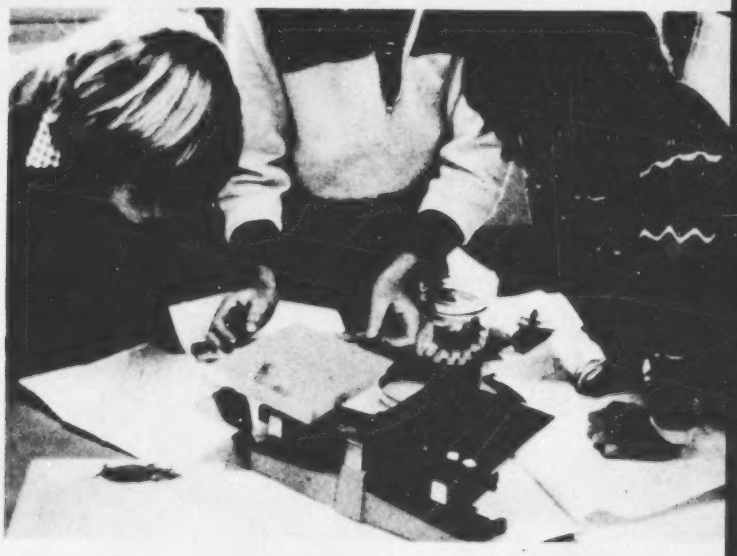
Focus Activities

During the four week period following the introduction of the eucalypt cards, preparations began for the arrival of our mice. This was done in an incidental and non-structured manner. Aquariums were washed and set up, food containers collected, water bottles organised and so on. At the end of the four weeks we were ready for the arrival of the mice.

We attempted to make the setting in the aquaria natural by using soil, peat moss, rocks etc. and sowing grass seed that soon germinated. Rocks were placed near the glass and the mice soon dug and made their homes in full view of any observer. During the next four weeks the children were able to watch the mice digging, sleeping, building, and feeding their young. This helped to develop their observational skills, as well as providing a social climate of shared involvement between the

Look at that bark!

That's not very heavy!



EUCALYPT RESEARCH CARD

7

BLUE GUM

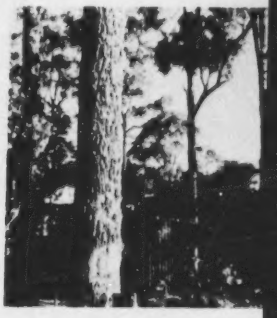
BARK: The bark is smooth and shiny and marked with large red, blue or grey patches. The bark falls off in ribbons.

HABIT: This tree grows to 45m. tall.

LEAVES: The leaves are pale green on both sides, and shiny. They are narrow at both ends and usually curved. They grow alternatively and not opposite each other. Most adult leaves are 21 cm. long and 2.5 cm. wide.

DISTRIBUTION: These trees grow from eastern Australia to Cape York and on to Papua New Guinea. They grow on river banks and flats.

	Bark on tree A	Bark on tree B
Texture (how does it feel)		
Colour		
Cracks (how many in the square)		
Width (are cracks wide or narrow)		
Direction (do cracks go up and down or sideways)		
	Rubbing tree A	**Rubbing tree B**



EUCALYPT RESEARCH CARDS

EUCALYPT RESEARCH CARD

QUESTIONS - CARD NO. 7

BLUE GUM

1. How does the bark fall from the trees?
2. What colours would you see on the bark?
3. What is a word to describe the feel of the bark?
4. What colour are the leaves?
5. Are the leaves thick or narrow at the ends?
6. How long are most adult leaves?
7. Where do these trees grow?
8. How tall might the tree grow?

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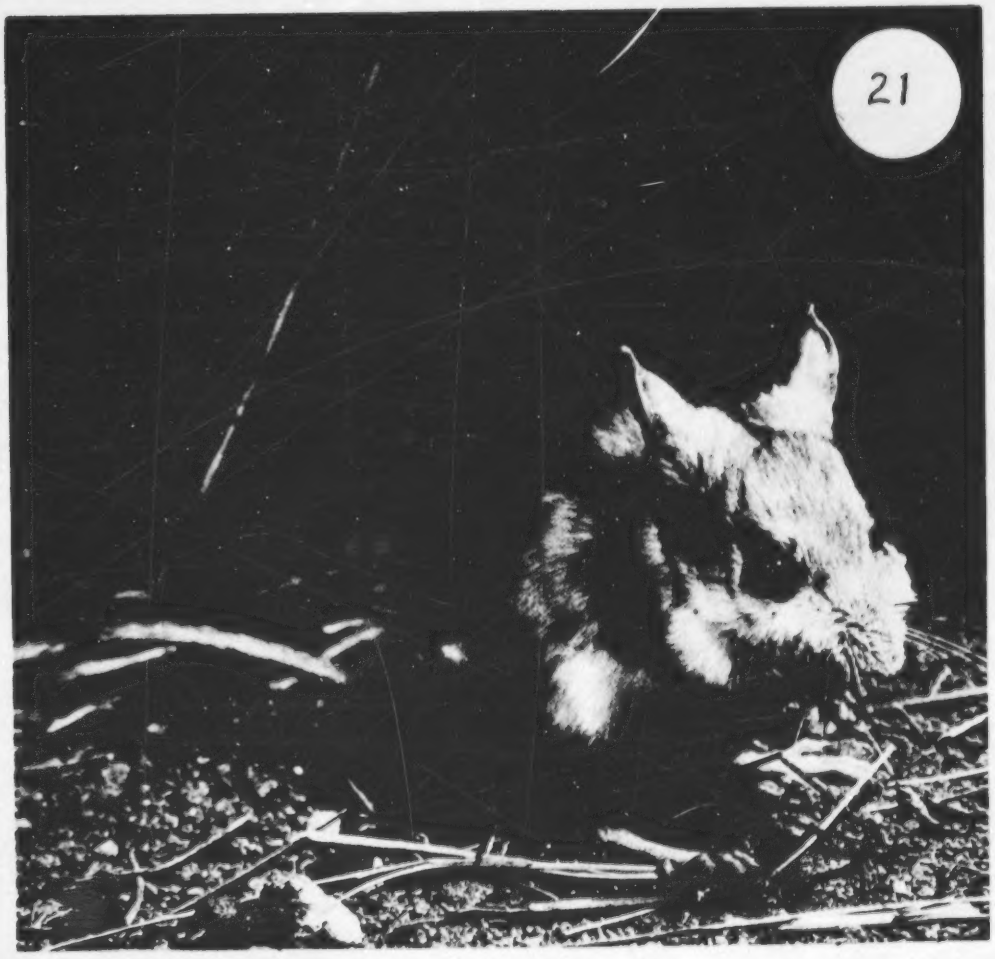


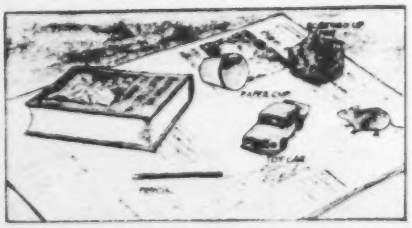
HOPPING (KANGAROO) MICE

Hopping mice have long ears and long back legs. They have long fine hairs at the end of their tails. They have sand coloured, soft fur.

MICE RESEARCH CARDS

A mouse in a new place MOUSE ACTIVITY CARD (6)

1. Put a mouse in a new place.
2. Answer these questions:
   (a) Which things does the mouse go to — first _____ second _____ third _____
   (b) How many times is each thing sniffed?
   (c) How many times does the mouse groom itself?
   (d) Do males act differently to females?



MOUSE RESEARCH CARD No. 21

HOPPING (KANGAROO) MICE

Questions

(a) Does this mouse have long or short ears?
(b) Are its back legs long or short?
(c) What do they have at the end of their tail?
(d) What colour is this mouse?
(e) Is its fur soft or course?

How long is that tail?

class and myself. This time was a 'hand on' experience, with the children getting accustomed to handling and feeding the mice.

By the end of that four weeks the three activity groups (Graph Kit, Eucalypt Research Cards, Eucalypt Activity Cards) were running smoothly, and interest in the mice was high. Then I introduced the mice activity cards.

Activity and Research Cards

As with the Eucalypt material the cards fell into two groups—research and activity. The research cards, which were introduced in week 13, dealt with 'Mice and Rats of Queensland' and were based on a booklet published by the Queensland Museum.

The mice activity cards, which I adapted from the ASEP unit 'Mice and Men', built on the skills gained through the eucalypt activity cards. They were more concerned with the forming of hypotheses and the planning of experiments and enabled the children to be more involved in making judgments, predicting and interpreting. These cards also provided greater opportunity for the children to construct their own materials for the conducting of experiments. Thus they required more 'thinking' involvement on the part of the children.

The mice activity cards were introduced in week 13 and replaced the graph kit as part of the three group cycle operating through weeks 9 eg to 13. For the next four weeks the three groups (Eucalypt and Mice research cards, Mice activity cards, and eucalypt activity cards) were given specific time slots each day. We again worked a one and a half-hour cycle, with half an hour spent on each activity. After working on the eucalypt activity and the eucalypt research cards during the previous four weeks, the children were quite competent to undertake these activities. The mice research cards were carried out in a similar manner to the eucalypt research cards and therefore did not require much introduction. Rostered mothers supervised two groups, the eucalypt activity and the mice and eucalypt research, leaving me free to give most of my attention to the group working with the newly introduced mice activity cards.

SOME SUBJECTIVE IMPRESSIONS

Near the end of the mouse unit I allowed one week of relative freedom. The children were able to work on any of the six kits in the room. They were totally responsible for organising their time and resources. I explained at the beginning of the week that each of the six kits must be used at some time. The result was very interesting. About sixty per cent handled the situation very well, thirty per cent reasonably, and ten per cent very poorly. This is what was expected. I did not assume that all children could handle every situation with equal skill. There was a marked improvement by most children in their ability to use some freedom, however, many of the children were able to work independently in the library, and collect information without my help.

I would emphasise that the children's freedom was freedom within a range of choice as I see the job of the teacher as being to widen children's horizon's progression through the provision of more and more choices. This cannot be left to chance but needs careful thinking through.

It has been interesting throughout the year to note the changes that have occurred. As skills were learned and acquired, the children were able to move into a more creative problem solving approach. It seems that the level of creativity was in many respects dependent upon the skills present. Skill oriented lessons, as ends in themselves, did not occur very often. Because skills were learned in a meaningful context (eg. 'I need to know how long this mouse's tail is'), a healthy relationship grew between skill and content. The children tried different things and were led into numerous possibilities. When the context was one of interest and meaning the skill took its proper place as a tool, aiding the observer in the collection of new and interesting material. The skills (processes) became the vehicle by which the children were

able to explore and allow their creativity to emerge.

On a number of occasions parents have commented on the level of knowledge shown by their children, especially during family outings to national parks. The children have taken their five month-old ecucalypt seedlings home now and some of their enthusiasm for their tiny plants has rubbed off on some parents. On more than one occasion I have had parents express their excitement that an environmental emphasis was being taken.

CONCLUSION

One way of defining the creative individual is as a person skilled in:

- solving problems
- choosing problems
- adapting to new situations
- thinking critically.

The three units allowed these skills to develop in an environmental context and the emphasis throughout was on using the skills in relation to the immediate environment. The units can therefore, be seen as a small aspect of a total program concerned with equipping children to make decisions concerning the quality of their environment.

Simply through the preparing and implementation of this program, I have felt a greater affinity with the environment and have become more aware and appreciative of its complex nature. I am convinced that if we want to create adults who are really concerned about the environment, then we must let our children touch it, be in it, and learn to love it. Numerous lectures on pollution will have little effect unless that environment has become a personal and living reality for the members of our future community.

APPENDIX 1

WIND IN THE EUCALYPTS

Sound	whispered	roared		sounded like	many voices
	whistled	mumbled			the surf
Trees	swayed	waved	rocked	were blown and buffeted	
	shook	rolled	bent		
Leaves	rustled	moved	shook		
	rolled	parted	trembled		
WIND itself was	cold	cutting	brisk		
	icy	sharp	freezing		
	nippy	rough	fresh		
My face and hands were	fresh	dry	numb	I had	goose bumps
	crisp	crinkly			watery eyes
	cold	burning			red runny nose
					smarting eyes

APPENDIX 2

Some Comments from Year 3 Pupils After Completing the Eucalypt and Mice Units

'Well I think eucalypt trees are good because they shade people from the sun.'

Teacher: 'But did you think that before you started these things?'

'No, I thought trees used to get in the way of people building things.'

Teacher: 'Tell me what you were saying yesterday Wayne: what does Brett do?'

'On the way home he's always saying eucalypt this, eucalypt that, I love eucalypt, look at that eucalypt up there, isn't it nice?'

Teacher: 'Would you say Brett talks about them a real lot?'

'Yes, he talks about them all day.'

Teacher: 'What about you Michael? You were saying something about Brett weren't you?'

'When he sees a baby eucalypt in the ground and someone pulls them out he punches them.'

. . . . . .

'Everytime I run through the bush it's nice and shady and you go out and its really hot.'

Teacher: 'So you enjoy it, it makes you feel better.'

'Makes me feel at home.'

Teacher: 'What do you mean at home?'

'Well it's very quiet.'

Teacher: 'You always want to go back to the bush?'

'The smells are very beautiful in the bush.'

. . . . . .

'I don't like mice experiments but I like eucalypt cards.'

Teacher: 'You didn't like mice experiments. Why was that Brett?'

'Not sure.'

Teacher: 'What about you Jean?'

'Well it's changed my opinion because I didn't know about eucalypt trees.'

Teacher: 'What about you Jeremy?'

'I think I get a little bit bored of mice experiment cards because when we get the mice in the tray and try to stretch their tail and it keeps slipping and he has to keep doing it again and again, and he wastes paper.'

GARDENSHARE

Audrey Windram
Mount Barker Primary School, South Australia

Gardenshare is a film about people gardening together, in school and/or community gardens. A number of the people shown still work together in those gardens, though the Beulah Road garden at Norwood and the East Street garden at Thebarton are no longer functioning on a community basis. People involved in these projects have used their experience to good effect. One, for instance, is now market gardening and another is share orcharding.

A community garden justifies itself everyday of its existence. A common feature of all projects was that within each, plants grew, skills were gained by the people involved, knowledge and understanding of nature increased, human interaction flourished and participants enjoyed themselves. People experienced tenderness towards each other when sharing gardening tasks. In addition, children developed an understanding of the various fruits and vegetables produced by the earth.

Different people garden for different reasons such as togetherness, gardening skills, profit and therapy.

The gardens at Arbury Park Outdoor School, Hawthorndene Primary School and Regency Park Centre for the Physically Handicapped were conducted on a well organised preplanned structure. However, factors such as individual differences and the uncertainties of nature itself provide excitement through the unexpected.

The film shows:

- *Nunawading Community Garden:* This was established by the Municipal Council at ratepayer request and is still flourishing well after about twenty months.
- *Beulah Road, Norwood:* This garden was initiated by interested people from Spring Park Community School.
- *The Box Factory:* This is the community centre in Adelaide from which the East Street garden at Thebarton was organised. If you live in Adelaide, you can contact them or C.I.T.Y. (Community Improvement Through Youth), King William Street, Adelaide. This organisation is funding some gardening projects.
- *Regency Park Community College:* This college in Days Road, Regency Park, conducts a course in gardening for unemployed young people.
- *Hawthorndene Primary School:* A Native Plant Propagation Project is well established.
- *Arbury Park Outdoor School:* This school at Bridgewater provides environmental education for South Australian school children.
- *Regency Park Centre for Physically Handicapped Children:* Days Road, Regency Park.
- *Taperoo High School:* Here a garden grows on top of concrete which is on top of beach sand.
- *Christies Beach High School.* There are meat and egg-laying birds and the garden has both individual plots and a community section.

Potential gardeners in any State should find Department of Agriculture personnel helpful, especially in the Home Gardening section. The Soil Association of South Australia is very willing to offer help to those interested in organic gardening and Henry Short, 6 Bickham Court, Dernancourt, can also give addresses of counterpart organisations in other States.

Victorians have the great advantage of the State Schools' Nursery which is well worth a visit from interstate people. Much benefit could be derived from collating details of gardens on a national basis.

Copies of the videotape are available from the Curriculum Development Centre, P.O. Box 52 Dickson, A.C.T. 2602. Please write for details.

ACTIVITIES USING ANIMALS IN ALL CURRICULUM AREAS

David V. Riordan and Maitland N. Peterson

PREAMBLE

Live animals offer a vast range of experiences for children and these experiences can be most effective in fostering a positive attitude towards living things and in developing a greater awareness of their needs. It is this view that David Riordan and Maitland Peterson develop in this discussion of how animals can be used in all areas of the curriculum. After an introductory note concerning the keeping of animals in the classroom, they explore how animals can be a stimulus for environmental education in each of social studies, geography, science, mathematics, language, art, music, physical education and drama.

KEEPING ANIMALS IN THE CLASSROOM

As a result of increased urban living, many children are divorced from animals and from the natural environments they inhabit. Lack of experience with animals breeds an ignorance, a lack of understanding, and, too often, a fear of living things which can only be overcome by providing children with structured experiences of animals in an environment with which they are comfortable. This provides the basic rationale for keeping animals in the classroom and discussing animals and working with them in all areas of the curriculum. These are means by which greater empathy with living things and the environment can be achieved.

Although animals have been kept successfully in primary classrooms in Australia, the range of suitable animals is quite small. The animals that have been maintained, fall into the two main categories of domestic animals and native fauna. Many factors must be considered BEFORE using animals as a stimulus in the curriculum. Among them:

- to foster correct attitudes, the animals' needs must come first
- the reasons for keeping the animals
- what animals are to be kept
- where the animals are to be obtained
- where the animals are to be housed
- the requirements such as food, water, temperature, humidity, and light that each animal has
- the cleaning that is required
- the amount of handling the animal safely endures
- what should be done in the case of injury, sickness or death
- the maintaining of animals on weekends and during holidays
- the use of animals in an educational context
- what should be done with surplus or unwanted animals.

Domestic Animals

Generally, these are more suitable for classroom use than wild animals. Their requirements are better understood than those of native fauna, and they can tolerate handling with less stress.

Poultry: The wide variety of domestic poultry offers an excellent resource for observation of general behaviour, physical requirements and life cycle work. Bantams are particularly useful because of their size and ease of handling.

Rabbits/Guinea Pigs: Though these are easily maintained, they present the following problems:

- They can breed at an alarmingly prolific rate presenting disposal problems.
- Overhandling can cause stress and even death. Handling by children must be carefully monitored. Guinea pigs are more suitable than rabbits for use with younger children, as handling presents fewer problems to the children.

Mice: Mice are convenient because of their size, but unless kept scrupulously clean, they SMELL.

Pets: Children's pets can be brought into the classroom on a day-to-day basis. They offer a valuable resource without many of the problems outlined above.

Farm Animals: Larger, domestic animals need pens/paddocks in the schoolgrounds. Some primary schools, with community involvement, operate mini-farms which require considerable organisation to be effective. Ideally, outside pens and/or hutches should be available to allow for stock rotation.

Native Fauna

All States in Australia have legislation protecting native fauna. The keeping of native fauna is only allowed by permit from National Park and Wildlife services of Fisheries and Wildlife divisions in each State. Each application to take and keep native fauna is judged on its merits; permits are rightly not granted lightly.

Mammals: Few native mammals are suitable classroom animals. Possums have been maintained (and even bred) in some classrooms, but their nocturnal habits make observation difficult. Some of the small carnivorous marsupials have been maintained. However, the most suitable mammal appears to be the Hopping Mouse (*Notomys alexis*), which though readily available to schools in South Australia and Western Australia, is only now becoming available to schools elsewhere. Wombats, wallabies and other large marsupials have only been maintained by a few schools and demand elaborate outdoor accommodation.

Birds: Most native birds are highly unsuitable for maintenance in the classroom. Properly housed, budgerigars and cockatiels have been bred and studied in many primary schools.

Reptiles: A variety of lizards and tortoises can be successfully maintained. If fed correctly they do well in the classroom environment. Snakes are not recommended, because of difficulties in providing the correct diet.

Amphibians: Frogs, though offering some feeding problems, do well if housed in a suitably set up terrarium.

Fish: Aquariums offer a chance to create a mini-environment which may be salt or fresh water, native or exotic. Many of the fundamental concepts involved in environmental education can be illustrated by the establishment of an aquarium. Many excellent books exist on the setting up and maintenance of aquariums.

Invertebrates: Often neglected, the vast array of native invertebrates offers an excellent resource for gaining an understanding of the environment. The collection, maintenance, study and *subsequent release* is easily achieved with invertebrates and may be the best starting point for teachers wanting to use animals in the classroom. Invertebrates cannot be recommended too highly because they raise fewer of the practical problems associated with housing larger animals.

Rules and Regulations

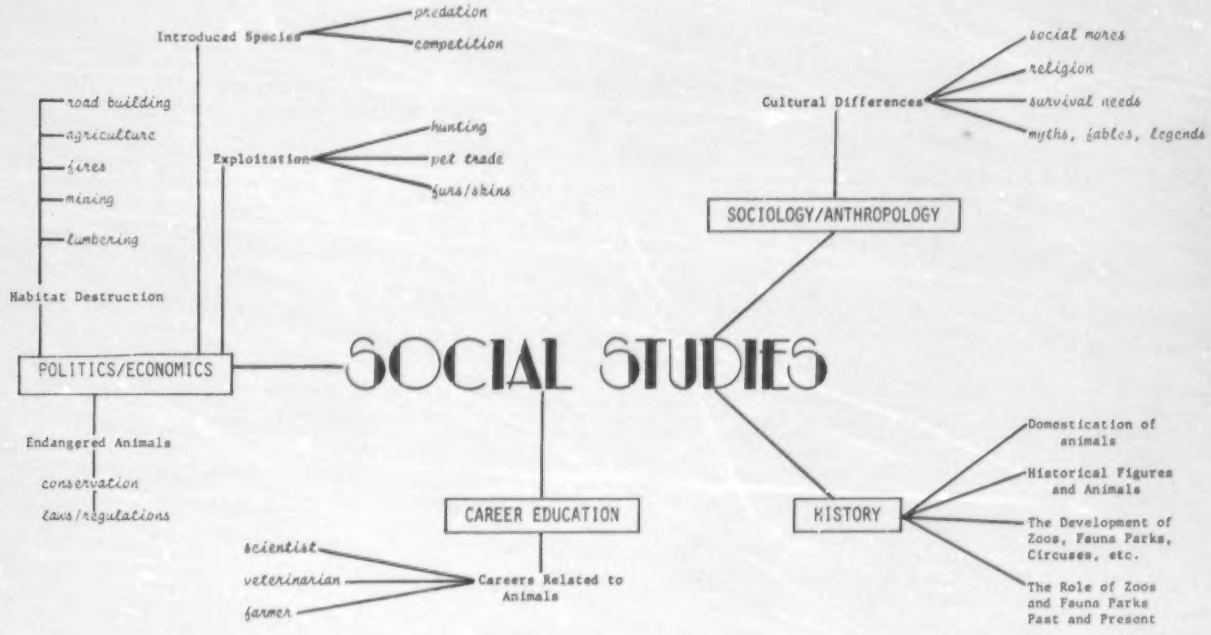
State Education Departments have no clearly stated policy on the maintenance of animals in school classrooms. Given adequate husbandry and provided their use is in an educational context, and despite many of the problems outlined, animals in the classroom are an invaluable stimulus. Reviewing the schools that have successfully maintained and used animals, has highlighted that careful planning and a large degree of community involvement are the principal ingredients for success.

ANIMALS ACROSS THE CURRICULUM

The following list of activities with animals has been organised around the nine subject areas of social studies, geography, science, mathemat-

ics, language, art, music, physical education and drama. For each subject area, the following format has been adopted. A flow chart which provides a summary of the subject is accompanied by a statement of aims for each topic area identified in the flow chart. The aims highlight key environmental topics and provide the basis for the activities which follow. The activities are a starting point only and are illustrative of the potential, through the use of animals, for developing increased environmental awareness. It is left to teachers to adapt, modify and extend the activities in ways that meet the needs of their students.

SOCIAL STUDIES—AIMS



Politics/Economics

To convey that:

- man influences his environment
- man's technology often has a destructive effect on his environment
- through individual and group action man can protect and preserve his environment.

Sociology/Anthropology

To point out that:

- Australia is a multi-cultural society
- an individual's cultural background influences his/her feelings and attitudes about the environment
- close contact with animals engenders a more positive attitude to the living world.

Careers

To demonstrate that:

- there exists a wide range of career opportunities relating to animals
- many careers offer opportunities to gain a greater knowledge of animals
- only by increasing our knowledge of animals can we effectively conserve them.

History

To show that:

- man has used animals in a variety of ways throughout history
- man has domesticated animals for his own benefit
- zoos and fauna parks now play a vital role in man's relationship with animals.

SOCIAL STUDIES—ACTIVITIES

Politics/Economics

PURPOSE: *To show that people can minimise their effect on the environment by planning and action.*

ACTIVITY: As a class activity, select an area of the schoolgrounds where people

walk. Within the area, mark off two patches of ground of the same size and shape. Enclose one patch so that people cannot walk on it. Leave the other marked patch so that it can be walked upon.

After one month see what differences the students can observe between the two patches. Can they account for these differences?

PURPOSE: *To illustrate some of the ways man uses animals.*

ACTIVITY: Have the children make a scrapbook about some animals that man uses for:

- food
- transport
- clothing
- as a source of power
- entertainment
- pets
- scientific experiments

PURPOSE: *To realise that man has domesticated animals for his own benefit.*

ACTIVITY: As a class project, collect menus from various local restaurants. Have the students try to figure out what animal products are included on each menu.

What animal is used most often?

What animal is used the least?

Make a graph to show how often animals are used for food.

PURPOSE: *To show that organisations can help to protect animals.*

ACTIVITY: As a class project, write a letter to one or more of the following groups. Try to find out these things:

- What goals the organisation has.
- What success the organisation has had in achieving its goals.
- What problems the organisation has encountered in trying to achieve its goals.

National organisations to contract:

World Wildlife Fund Australia
Level 12, CAGA Centre
8-18 Bent Street
SYDNEY, N.S.W. 2000

Project Jonah
c/- 399 Pitt Street
SYDNEY, N.S.W. 2000

Australian Wildlife Protection Council
c/- A. Queripel
14 Strangway Terrace
PORT ELLIOT, S.A. 5212

Kangaroo Protection Committee
G.P.O. Box 3710
SYDNEY, N.S.W. 2000

Wildlife Preservation Society of Australia
G.P.O. Box 2030
BRISBANE, QLD 4001

World League for the Protection of Animals, Australia
G.P.O. Box 3719
SYDNEY, N.S.W. 2000

Australian Conservation Foundation
672B Glenferrie Road
HAWTHORN, VIC. 3122

RSPCA
Branch in your State.

Find out about some other organisations in your State or city. Write to them.

Sociology/Anthropology

PURPOSE: *To test if contact and experience of the real animal changes children's attitudes toward the animal.*

ACTIVITY: Select a readily available animal that is likely to elicit a negative response from the children such as a worm, frog, lizard, tortoise.

Firstly tell the children what animal you are going to show them. Ask them to record their reaction to touching the animal on a scale, such as:

1	5
Definitely will not touch.	Would like to touch it very much.

Having explained the need for quiet and gentle handling, show the children the animal. Discuss the animal at length with the children making close observations and allowing some contact.

After this experience record the children's reactions to touching the animal using the scale.

Discuss and compare the differences that are shown in these reactions with the ones recorded prior to animal contact.

Careers

PURPOSE: *To show there is a wide range of jobs working with animals.*

ACTIVITY: Here are some places that may be near you, where people work with animals:

- Horse race track
- Stud farm
- Riding school
- Dogs' home
- RSPCA
- Veterinary clinic
- Zoo or Fauna park
- Pet shop
- Farm.

For a class excursion, visit one of these places and tape an interview with someone working there. Before your interview, make a list of questions. You may want to know what they do, how they got the job, how they feel about animals, and so on.

PURPOSE: *To show that some jobs require a knowledge and understanding of animals.*

ACTIVITY: Invite someone working with animals to give a talk about what they do. Find out how their occupation is of benefit to animals. Discuss whether their occupation may cause harm to animals. Explore the question 'Can harm to an individual animal or particular species be justified if others (humans or animals) benefit in some way?' Discuss other jobs where people work with animals in a similar way.

PURPOSE: *To show that some jobs require a great knowledge and understanding of animals.*

ACTIVITY: Research and then write about one day in the life of a zoo keeper, a veterinarian or a veterinarian's assistant, a farmer or any other person who works with animals.

History

PURPOSE: *To realise that man has domesticated animals for his own benefit.*

ACTIVITY: Suggest to the children that they find out about some of the animals that have been most closely associated with man. These include horses, dogs, cats, cows, sheep, goats, camels, chickens and ducks.

Have them compare their findings. What animals do they think have been most beneficial to man? Ask them to give reasons for their answers.

As a further activity, the children could be urged to compile what they find out into a book on domesticated animals. This book could then be placed in the school library.

GEOGRAPHY—AIMS

Habitat

To convey that:

- animals have specific requirements
- animals live in different habitats
- living things are interdependent.

Seasons

To show that:

- the number of seasons is determined by geographic location
- living things are influenced by the seasons.

Catastrophies

To point out that:

- man has much to learn about his environment
- man changes his environment in rapid and often catastrophic ways
- natural catastrophies can profoundly change the environment.

Populations

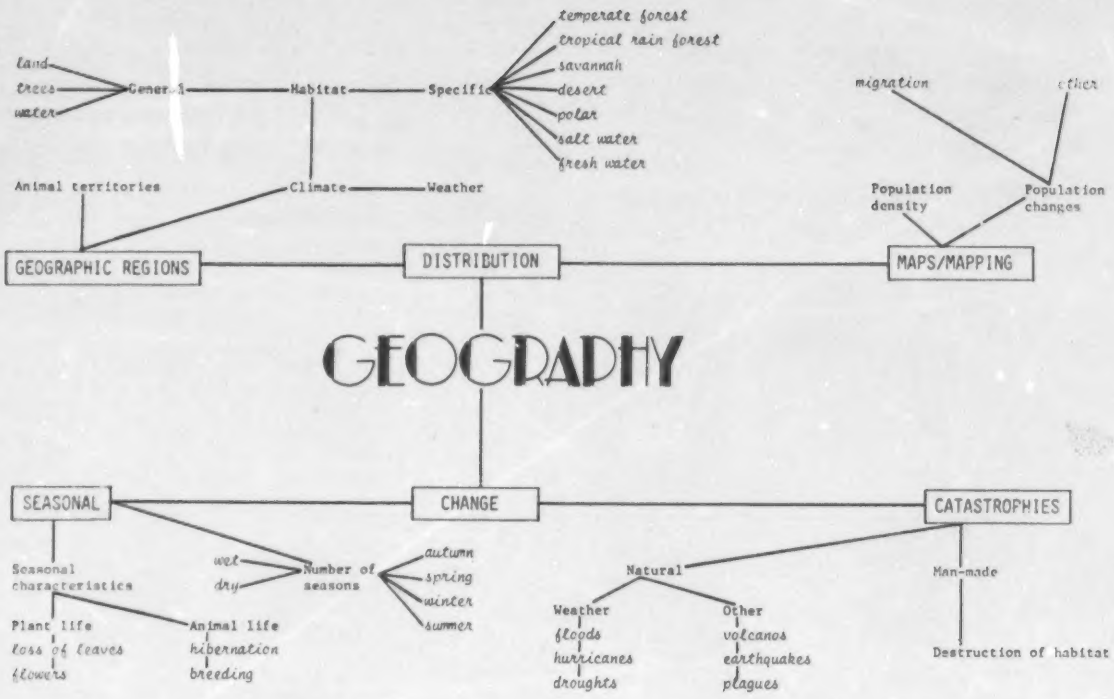
To illustrate that:

- every organism can only sustain a certain population density
- populations are dynamic.

GEOGRAPHY—ACTIVITIES

Habitat

PURPOSE: *To show that animals live in different habitats.*



ACTIVITY: Tell the children that the places where animals live are called 'habitats'. Have a class discussion about habitats:

- What does a habitat consist of?
- How many different habitats can the children identify?

Suggest to the children that they might like to construct dioramas or paint murals of different habitats. Divide the class into four groups. Have each group research one of these habitats:

Rainforest—found in	Central and South America Northern Australia South-East Asia Africa
Desert—found in	Australia Africa/Middle East North and South America
Grassland—found in	North and South America Africa Australia
Polar—found in	Arctic Antarctic

Before actually constructing dioramas or painting murals, each group should decide:

- what natural features exist in the chosen habitat?
- what plants exist in the habitat?
- what animals exist in the habitat?

These should be appropriate to the habitat and geographic region selected.

PURPOSE: *To show that animals live in different habitats.*

ACTIVITY: As a class excursion, investigate your schoolyard, local park, or a nearby steam or pond. Ask the children to look carefully for some 'mini-habitats'. These mini-habitats will provide different conditions and therefore will support different animals. Here are some examples:

- On top of and under rocks.
- In thick grass and open ground.
- On the bark of trees and under the bark of trees.
- At the water's edge and in deep water.

Select one of the mini-habitats studied and attempt to duplicate it in a terrarium or aquarium. Some of the better examples are a cross section of a pond, life in leaf litter, a wormery, an ant farm, or a snail colony.

Seasons

PURPOSE: *To show that animals are influenced by seasonal changes.*

ACTIVITY: As a continuing class project, construct a time line to show the seasonal changes that take place during the school year. Spend a few minutes each day discussing changes in the weather, the animal life, and plants that the children have observed. Suggest to the children that they can draw pictures, or provide words, phrases or sentences to add to the time line.

PURPOSE: *To show that animals are influenced by seasonal changes.*

ACTIVITY: As an ongoing class activity, study a classroom or family pet with regard to seasonal changes.

Suggest to the children that changes may occur in the following areas:

- Food intake
- General activity
- Colour
- Thickness of coat
- Readiness to reproduce

Produce a class book to record the observations.

Catastrophies

PURPOSE: *To show that man's influence with the environment upsets the balance of nature.*

ACTIVITY: Discuss with the children what is meant by a native Australian animal.

Tell the children that these animals exist in Australia, but are not native animals:

sheep	fox	camel	pig
cattle	rabbit	myna bird	deer
rats	sparrow	cat	water buffalo
carp	trout	dog	banteng
		cane toad	

By using all available resources (Fisheries and Wildlife, conservation groups, books, magazines and newspapers), suggest to the children that they find out the following:

- How the animals got to Australia.
- The problems they cause to the native fauna.
- The effect these animals are having on the environment.
- What is presently being done to control these introduced animals.

Ask them also to consider what they think should be done.

Note: Suggest that the children find out what *feral* animals are.

The children could try and assess which animal group has had the most impact on the environment, introduced wild animals or feral animals.

PURPOSE: *To show that natural catastrophies affect the environment.*

ACTIVITY: Discuss with the children natural catastrophies and see how many types they can think of. Make a class list. Some might include:

- hurricanes
- cyclones
- tidal waves
- earthquakes
- volcanoes
- drought
- flood
- fire

Encourage the children to keep a scrapbook of natural catastrophies reported from around the world.

Suggest to the children that they could draw pictures, make a mural, construct models or dioramas to illustrate various types of natural catastrophies.

Have the children investigate what happened in these famous natural catastrophies:

Volcanoes:	Krakatoa	Aug. 1883
	Vesuvius	79 AD
Earthquakes:	San Francisco	1906
	Agadir	1960
Black Friday	Vic./N.S.W.	1939
Cyclone Tracy	Darwin	1974

Populations

PURPOSE: *To provide experience in census taking.*

ACTIVITY: Have the students take a class or a school census. Have the children count the number of boys/girls in their population. Have the children count the number of boys with black hair, with brown hair, with blonde hair, and with red hair. Do the same for the girls. Record the results, and discuss what you find out.

PURPOSE: *To demonstrate that populations of animals within an area change.*

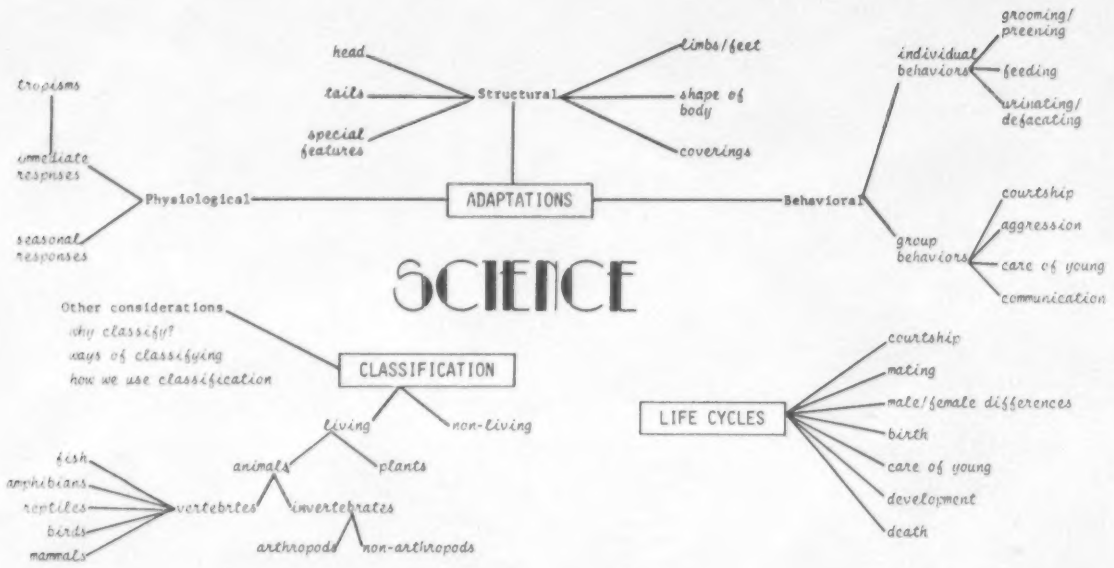
ACTIVITY: Have the students mark out a square metre of well planted schoolground. As a class activity, count the number of animals that are found within the marked area. The students should be told that they must try and avoid damage to any plants/animals within the sample area and immediate surroundings.

Record the number of different animals that are found. Repeat the activity daily for one week.

Suggested questions:

- Does the number of animals in the study area remain constant?
- Where do 'new' animals come from?
- Where do 'missing' animals go?
- Did our sampling activities affect the animal population?

SCIENCE—AIMS



Adaptation

To convey that:

- animals have certain basic needs
- animals have structural features, physiological mechanisms and behaviours (adaptations) which all serve to achieve their basic needs
- any interpretation of an adaptation is only an hypothesis or intelligent guess.

Classification

To show that:

- there exists an enormous variety of living organisms
- man groups animals for convenience
- living organisms can be grouped in different ways.

Life Cycles

To point out that:

- an animal's life cycle may include: courtship, mating, birth, care of young, growth/development and death
- the animal kingdom has a variety of life cycles
- man can alter an animal's life cycle.

SCIENCE—ACTIVITIES

Adaptation

PURPOSE: *To identify some basic animal requirements.*

ACTIVITY: Have each child select their favourite animal and do some research to find out:

- where it lives
- what it eats
- how it protects itself
- how it reproduces.

Suggest that each child produce an illustration of the animal to accompany a report. Display the work.

PURPOSE: *To demonstrate that animals are built differently and behave differently according to where they live.*

ACTIVITY: Tell the students they will design an imaginary animal according to the information you will give them. Here are some suggestions to get you started.

ANIMAL I	ANIMAL II	ANIMAL III
Mammal	Reptile	Bird
Tree-dweller	Water-dweller	Nocturnal
Meat-eater	Plant-eater	Ground-dweller
Nocturnal	Diurnal	Fruit-eater

Ask the students to provide an appropriate name for their animal.

PURPOSE: *To understand that any reason man supplies for an animal's adaptation(s) is only a guess.*

ACTIVITY: Discuss with the students one obvious feature of an animal, such as:

- Giraffe — long neck
- Zebra — stripes
- Elephant — trunk
- Kangaroo — pouch
- Echidna — spikes

How many different explanations can the students come up with for a given feature? Assure the students that there are no wrong answers only more likely explanations.

Classification

PURPOSE: *To illustrate some of the differences between living and non-living things.*

ACTIVITY: Show the children a selection of living and non-living things. These might include:

- rocks/stones
- man-made objects
- plants
- animals
- water

Have the children group the objects into two groups—living and non-living. Ask the children to supply reasons for their groupings. Make a list of their reasons.

PURPOSE: *To show that there exists a variety of animals.*

ACTIVITY: Accumulate a large number of animal pictures or photos. Try to represent as many of these animal groups as possible:

- Insects
- Spiders
- Molluscs
- Crustaceans
- Fish
- Amphibians
- Reptiles
- Birds
- Mammals

Ask the students to sort the pictures into groups. Tell them you will want them to justify their groupings.

In a class discussion, try to get the students to list some of the common characteristics for each of the above groups. As they study more about animals, they can add things to the lists.

Life Cycle

PURPOSE: *To show that an organism's life cycle may include numerous activities and that there exists a number of different life cycles.*

ACTIVITY: Depending on what is available in your particular area at a given time during the year, try to acquire one of the following:

- caterpillars
- mealworms
- crickets/grasshoppers
- frog spawn (eggs)

Set up a suitable enclosure for long-term maintenance and observation in the classroom.

Have the children record through writing and drawing as many different stages of development as they can observe/identify.

All four suggested creatures go through metamorphosis. The

various stages of metamorphosis for each of the animals is as follows:

Eggs, *caterpillar* (larva) pupa adult (butterfly or moth)

Eggs, *mealworm* (larva) pupa adult (beetle)

Eggs, a number of immature stages, adult (*grasshopper, cricket*)

Spawn, (eggs) tadpoles (development of legs and loss of tail) adult (frog)

PURPOSE: *To show that an organism's life cycle may include numerous activities and that there exists a number of different life cycles.*

ACTIVITY: Obtain some fertile chicken eggs and incubate them in the classroom (see note below). Encourage children to record changes by 'candling' which involves holding an egg up to a strong light to check the development of the embryo (if the egg is fertile, it should contain a growing dark mass. Movement may be observed in later stages). Keep a class book on the development of the egg over a twenty-one-day period. Include children's drawings and writings.

When eggs have hatched, keep a careful record of such changes in the chicks as their size, weight, food intake and feather development.

NOTE TO THE TEACHER:
Instructions for incubating eggs in an electric fry pan.

1. Cover bottom of fry pan with sand.
2. Place a small dish of water in pan. (Keep it topped up).
3. Place a thermometer in pan.

PURPOSE: *To point out that death is a part of every life cycle.*

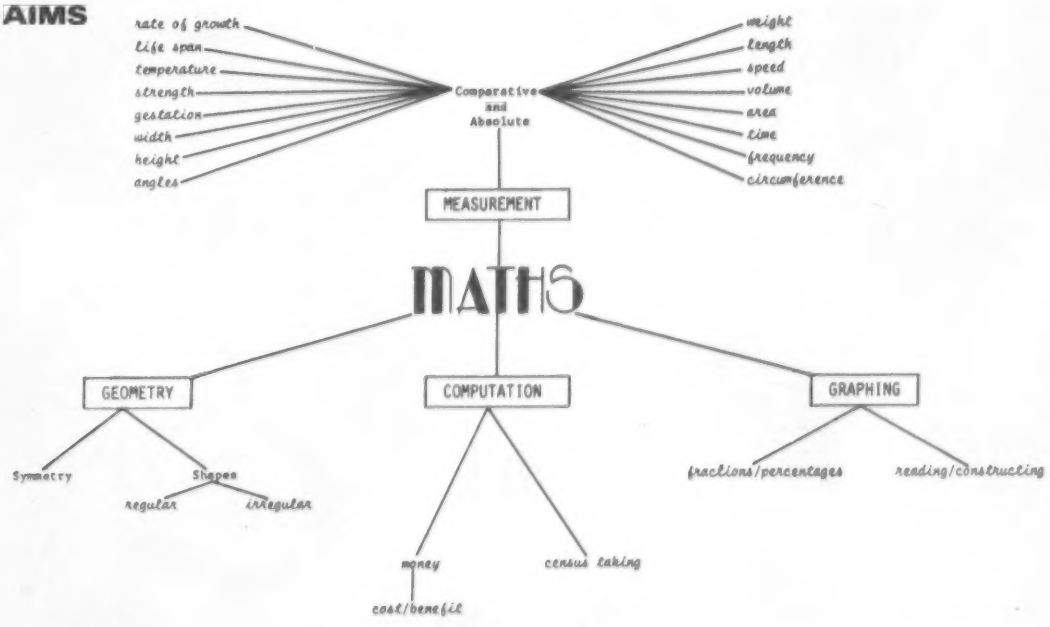
ACTIVITY: Have a class discussion about death and dying in animals. This discussion could arise from the death of a classroom or family pet. Since death is often frightening to children, great care should be taken in introducing the topic. Be aware that some children will want to talk about death—they should not be pressured to do so.

Try to discuss these ideas:

- What is death?
- What happens when something dies?
- Has an animal you liked ever died?
- How did you feel?

Children could be encouraged to write the epitath of a favourite animal.

MATHS—AIMS



Measurement

To explain that:

- animals can be measured in a variety of ways
- measurements reflect environmental influences.

Graphing

To point out that:

- graphing is a convenient way to summarise and compare data
- there are a variety of graphing techniques
- graphing offers opportunities for prediction.

Geometry

To demonstrate that:

- animals show a bewildering number of shapes
- symmetry is the most frequently shown geometric concept in animals
- an animal's shape relates to its achieving its survival needs in its environment.

Computation

To show that:

- computation offers a useful way of ascertaining numbers of animals
- monetary gain is often a stimulus for the way in which man interacts with his environment;
- preservation of the natural environment has a financial cost.

MATHS—ACTIVITIES

Measurement

PURPOSE: *To allow students to experiment with various methods of measurement.*

ACTIVITY: Using a classroom or family pet, have the students measure the food consumption of the animal for one week. Measurements should be taken at the beginning and end of each day. You should remind the students to allow for spillage and not to restrict the animal's food intake. Suggest that they keep records of their measurements.

Of the foods offered, which was the most preferred?

PURPOSE: *To allow students to experiment with various methods of measurement.*

ACTIVITY: Give the class the following elephant weights:

Male Indian elephant	—	5000kg
Female Indian elephant	—	4500kg
Male African elephant	—	6000kg
Female African elephant	—	5000kg

Weigh all class members. Add the weights together for total class weight. Add all girl weights together for total girl weight. Add all boy weights together for total boy weight.

Is the total girl weight equal to either of the female elephant weights? What are the differences?

Is the total boy weight equal to either of the male elephant weights? What are the differences?

Is the total class weight equal to any of the elephant weights? What are the differences?

Graphing

PURPOSE: *To familiarise the student with circle graphing techinques.*

ACTIVITY: Using information obtained from an animal kept in the classroom, or a pet, have the children draw a circle graph to show the animal's food preferences.

Given the information below, ask each student to construct a circle graph to show the relative numbers of each type of pet kept in Australia:

Dog	:	48%	Cat	:	30%
Bird	:	12%	Fish	:	7%
		Other	:	3%	

PURPOSE: *To familiarise the students with circle graphing techniques.*

ACTIVITY: As a class activity have the students brainstorm and record as many animals they can think of with hooves, webbed feet, paws with claws, hands with nails, and flippers.

Make a class list of the total number of animals in each category. Have the students construct a circle graph to summarise their results.

PURPOSE: *To familiarise the students with simple line graphing techniques.*

ACTIVITY: As a class activity, have the students keep a daily record of the

temperature in the classroom and in an aquarium/vivarium kept in the classroom over one month.

Suggest that they compare the range of temperatures in the two areas by drawing a simple line graph.

Suggested questions:

- In which areas does the temperature vary most?
- Which area recorded the highest temperature?
- Which area recorded the lowest temperature?
- What effects do you think the range of temperatures might have on the animals in the aquarium/vivarium?
- What effects do you think the range of temperatures in the classroom has on you?

Geometry

PURPOSE: *To demonstrate that animals have many different shapes.*

ACTIVITY: As a class discussion, see how many different animals the children can list which come closest to the following shapes:

- circle
- square
- triangle
- rectangle
- oval

Using the shapes above *ONLY*, have the children draw the following animals:

- elephant
- kangaroo
- giraffe
- koala
- hippo
- stumptailed lizard
- emu
- penguin
- crocodile
- rabbit

NOTE: Children should be told to draw the animals using as *FEW* of the shapes as possible.

Computation

PURPOSE: *To show computation is useful in predicting likely costs.*

ACTIVITY: Tell the students they have been put in charge of managing the budget for a zoo. The zoo must cut its costs, so the most expensive animal to feed must be sold to another zoo.

Give the students the following information:

ANIMAL	WEIGHT (kg)	FOOD/WEEK (kg)	FOOD/BODY WEIGHT %
Lion	200	25 (meat)	
Caracal Lynx	14	2 (meat)	
Koala	10	7 (leaves)	
Tapir	220	84 (hay)	

- Which animal eats the most food in relation to its body weight?
- Which animal eats the least food in relation to its body weight?

Give the students the following food costs:

Meat	$2 per kg
Leaves	$10 per kg (to collect, petrol costs)
Hay	10c per kg

Have the students rank the animals in order from the most expensive to the least expensive to feed.

- Which animal must be sold to another zoo?
- How many caracal lynx can be kept for the same cost as one lion?

LANGUAGE—AIMS

Writing

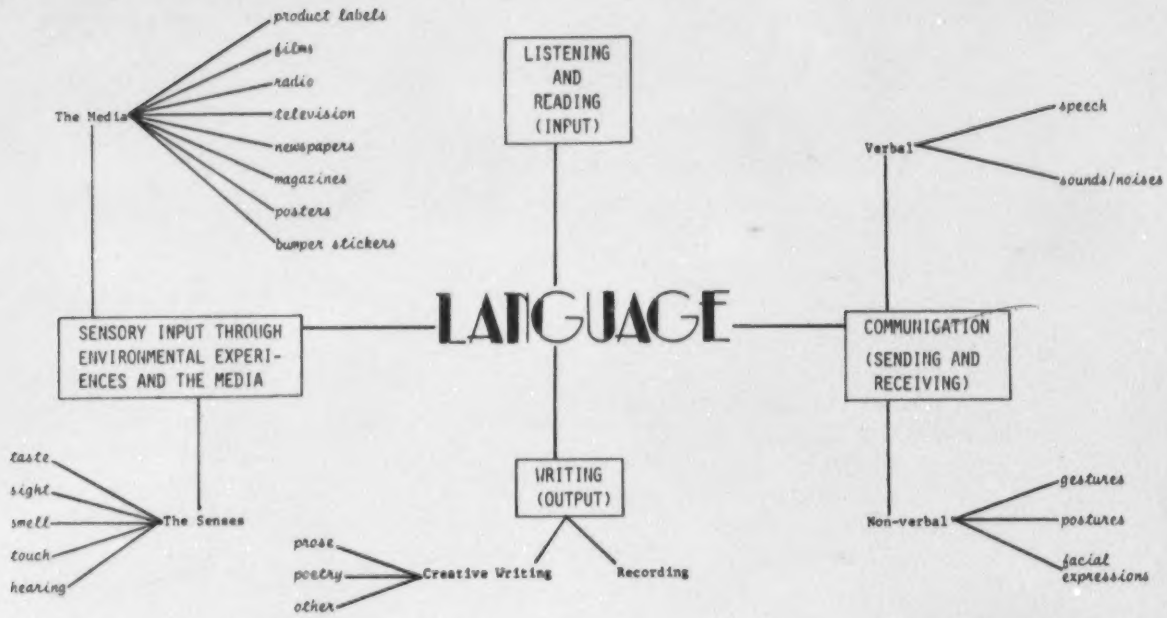
To point out that:

- man is the only animal to record communications permanently
- there exists a variety of forms of writing
- the written word has a huge impact on human thoughts and actions.

Communication

To convey that:

- communication occurs through all the senses
- complex language seems to distinguish man from other animals
- man has found it difficult to communicate with animals.



Environmental/Media Experiences

To explain that:

- the senses filter an organism's environmental experiences
- senses vary in their degree of development in different animals
- man is increasingly sensorily isolated from the natural environment and dependent on the media for experiences.

LANGUAGE—ACTIVITIES

Writing

PURPOSE: *To familiarise the students with record-keeping as a form of writing.*

ACTIVITY: As a class activity, keep a record of the feeding habits of a classroom pet over a period of time.

FEEDING RECORD OF.....

DAY	DATE	TIME	WHAT IT ATE

After the records have been kept for some time, ask the children:

- What is the animal's favourite food?
- What is the animal's least favourite food?
- How often does the animal feed? in one week, two weeks, one month, etc?
- At what time of the day does the animal most often feed?
- Do you think it feeds at night?

PURPOSE: *To illustrate that many people working with animals keep records.*

ACTIVITY: Talk with the class about the importance of record-keeping with regard to various occupations (e.g. doctor, solicitor, shopkeeper). Discuss the various types of records people in these occupations keep and reasons why they keep them.

As a class, develop a chart and then do research to find out about the records kept by each of these people working with animals:

- animal researcher
- dairy farmer
- cattle farmer

- pet shop owner
- laboratory technician
- marine biologist
- sheep farmer
- poultry farmer
- zoo keeper (fauna park)
- commercial fisherman
- fisheries and wildlife ranger
- stud farmer (dogs/horses)
- animal racer (horses/dogs/pigeons)

Try to gain your information through letter-writing, interviews, class excursions and guest speakers. If possible, ask each 'animal person' to supply you with a blank record form or card and make a class display.

PURPOSE: *To demonstrate that poetry is one form of creative writing useful in expressing feelings, attitudes and experiences.*

ACTIVITY: Discuss with the children what poetry is. Read them some poems. Suggest that they try writing some poetry of their own.

Here are some possibilities:

CINQUAIN

The cinquain is probably the easiest form of poetry for children to write. Its format is as follows:

Line 1: One word title

Line 2: Two words describing title

Line 3: Three action words

Line 4: Four words of feeling

Line 5: One word synonym for title

e.g.

TIGER
LARGE, STRIPED
SNEAKING, POUNCING, KILLING
BEAUTIFUL, GRACEFUL, POWERFUL, DANGEROUS
CAT

HAIKU

Haiku is an ancient form of Japanese poetry. Classical haiku is only a form of description—the reader is expected to 'feel' the scene described for himself. Almost always, one word within the poem refers to a season of the year.

Line 1: Five syllables

Line 2: Seven syllables

Line 3: Five syllables

e.g.

THE KANGAROO HOPS
THROUGH THE DRY, SCORCHING HEAT, IN
SEARCH OF FRESH GREEN GRASS

LIMERICK

The limerick is a humorous verse named after Limerick, Ireland. It is more difficult for children to write because it incorporates a rhyme pattern and strong beat.

Rhyme Pattern:

Line 1: A

Line 2: A

Line 3: B

Line 4: B

Line 5: A

e.g.

THERE WAS A RED APE AT THE ZOO
WHO OPENED A BUCKET OF GLUE.
HE COVERED HIS KEEPER,
A NOSEY OLD PEEPER,
AND NOW HE HAS NOTHING TO DO!

FREE VERSE

Free verse is poetry without metrical pattern or rhyme. Its lines are divided according to natural patterns of speech.

e.g.

THE EAGLE SOARS THROUGH THE AIR,
WINGS SPREAD, EYES ALERT,
WAITING TO DIVE AND KILL
THE MEAL IT HUNGERS FOR.

PURPOSE: *To show that stories are a form of creative writing useful in expressing feelings, attitudes and experiences.*

ACTIVITY: Hold a class discussion on story writing. Talk with the students about plot, characters, theme and climax. Explain to the students that animal stories fall into three broad categories:

- Animals who act like people.
- Animals who live like animals but talk.
- Animals who act like animals.

Suggest to the students that they try writing their own animal stories. Here are a few starting points:

- PERCY PORCUPINE HAS A HAIRCUT

- THE KANGAROO WHO COULDN'T HOP
- THE FIRST RABBIT IN AUSTRALIA
- THE MISUNDERSTOOD DINGO
- GIRAFFE BIRTHDAY PARTY
- BETTY AND BLUE WHALE AND ME.

PURPOSE: *To give the student opportunity to explore and experiment with other forms of writing.*

ACTIVITY: Introduce to the children these forms of writing:

- Legends
- Myths
- Fables
- Folk Tales
- Fairy Tales
- Cartoons
- Comic Strips
- Jokes/Puns
- Riddles

Ask the children to bring in examples to share with the class.

Investigate how frequently animals are incorporated into each writing form.

Encourage the children to try writing one or more of these writing forms.

Talk to the children about mythical creatures in literature. Have them find out about these mythical creatures:

- Bunyip
- Unicorn
- Sphinx

Suggest that they draw pictures to illustrate what they have found out. Can they think of other mythical creatures?

Communication

PURPOSE: *To demonstrate that communication can occur without the use of language.*

ACTIVITY: Ask for a volunteer from the class. Tell the volunteer that he or she must try and convey *one* of the following feelings to the rest of the class, without using any sounds. Explain to the student that only body posture, facial expressions and gestures can be used.

Feelings:

- Anger
- Fear
- Tension
- Danger
- Happiness
- Sadness
- Hunger

Repeat the activity using different volunteer students.

PURPOSE: *To show that animals communicate using many different sounds.*

ACTIVITY: Ask the children to fill in the table below:

ANIMAL	SOUND(S)	WHEN USED?
blue-tongue lizard	hiss	warning off other animals
bearded dragon		
willy wagtail		
rooster		
cat		
frog		
cricket		
mosquito		
cockatoo		
whipbird		
possum		
bat		

Have a class discussion and make a list of the most common animal sounds.

Environmental/Media Experiences

PURPOSE: *To show the importance of touch in understanding the environment.*

ACTIVITY: Ask the children to feel different objects in the classroom or schoolyard with different parts of their body. What words can they find to describe what they feel?

For example, feel a flower petal with your cheek.

PURPOSE: *To show the importance of touch in understanding the environment.*

ACTIVITY:

Construct a 'feely' box as shown above, or improvise with a cardboard box or cloth bag.

Place an unknown, harmless animal or object in the box.

Select one child to 'feel' for the class. Explain that he/she should explore the animal/object by feeling gently inside the box.

Encourage the other members of the class to ask the 'feeling person' questions. Suggest that they ask questions *about* the animal or object and not what it is.

Record what the class finds out. Finally, ask various class members to try and identify the animal/object.

PURPOSE: *To show the importance of sight in understanding the environment.*

ACTIVITY: Have an excursion in the schoolyard or local park, where you could try the following:

- Have an ant hunt.
- Explore the surroundings using a magnifying glass, binoculars or telescope.
- Use different coloured pieces of cellophane, and view the environment in different colours.
- Look for patterns in trees, clouds or rocks.

On returning to the classroom ask the children if they can recall:

- something yellow
- something big
- something square
- something bright
- etc. . . .

PURPOSE: *To show the importance of sound in the environment.*

ACTIVITY: Have the children make a tape of familiar classroom sounds, such as a pencil sharpener, chalk on the blackboard, or chairs moving.

Have them sort the sounds that they tape.

Some suggested groups:

- loud
- soft
- high
- low
- happy
- sad
- squeaky
- deep
- etc. . .

PURPOSE: *To show that smell is important in understanding the environment.*

ACTIVITY: Place a range of different smelling substances in small jars or cans. See if the children can identify the substances by smell alone. What words can the children think of to describe each smell?

Suggested substances:

- cheese
- cloves
- soap
- mint
- paraffin
- coffee
- hay
- pepper

PURPOSE: *To show that taste can tell us a lot about the things we eat.*

ACTIVITY: Have the children taste some foods that look the same but taste differently.

Some examples:

- water
- white vinegar
- flat lemonade
- peppermint essence
- soda water
- mineral water
- icing sugar
- white flour
- salt
- bicarbonate of soda
- cornflour
- vanilla junket

Ask the children for some words to describe the different tastes.

Ask the children which foods tasted good and which ones they did not like.

PURPOSE: *To show that animal senses are developed to different degrees.*

ACTIVITY: Have a class discussion and have the children decide which senses are most important to these animals:

- echidna
- bat
- possum
- tapir
- penguin
- seal
- frog
- dog
- gorilla
- man

Make a class list of the results. Which animal has the best:

- sense of smell
- sense of sight
- sense of hearing
- sense of touch?

NOTE: Tell the children to base their decisions on what they can see in the animal: e.g. echidna's long nose and good sense of smell.

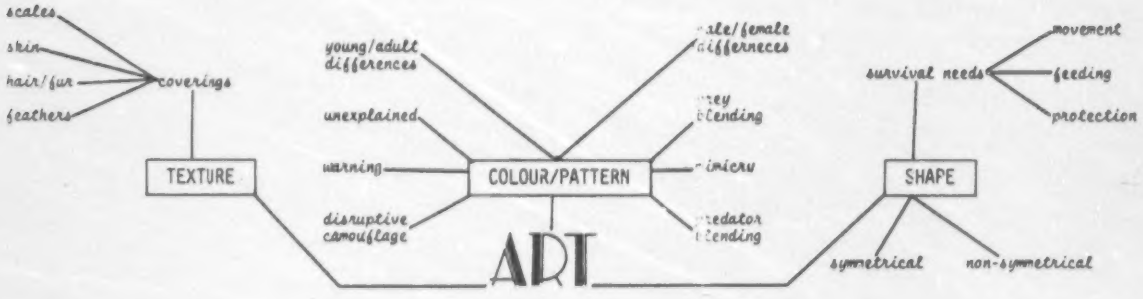
PURPOSE: *To demonstrate that animals are often used commercially by the media.*

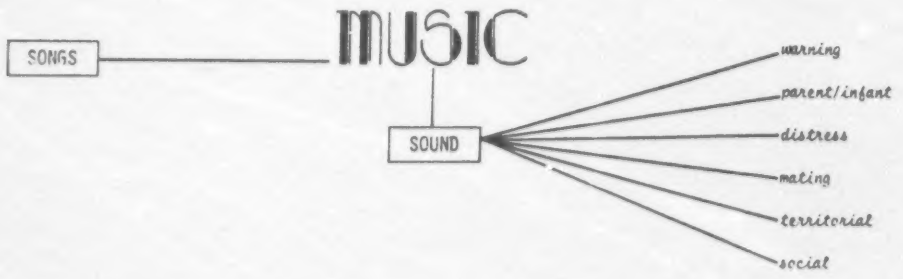
ACTIVITY: Have a class discussion about which animals the students have seen used in advertising. Suggest to the students that they make a scrapbook of animal advertisements using magazines, newspapers, product labels, stickers and posters. What was the purpose of the advertisement? Why was the animal used?

Ask the children to write their own animal advertisement.

Discuss which sort of animals are most commonly used in advertising. Ask the student for any reasons they can think of as to why these animals are used more often.

ART/MUSIC—AIMS





Texture

To show that:

- the ultimate reason for body coverings is protection
- coverings occur in a variety of textures, patterns and colours
- the beauty of many animal body coverings has led to their exploitation by man.

Colour/Pattern

To point out that:

- there are more reasons for colour and pattern than camouflage
- the basic uses of colour/pattern include, mating, defence, food getting and communication
- it is often difficult to explain advantages of colour and pattern for a particular animal in its environment.

Music

To illustrate that:

- animals produce sound in a variety of ways
- animal sounds have inspired man in his production of music.

ART/MUSIC—ACTIVITIES

Texture

PURPOSE: *To understand that animal coverings come in a variety of textures.*

ACTIVITY: Blindfold a child in the class. Have the child try to identify through feeling, various animal coverings (real or simulated). Here are some suggestions:

- fur or hair
- feathers
- scales
- spikes (e.g. caterpillar)
- shells
- smooth, moist skin

To involve the other children in the activity, put the object in a box, so that it cannot be seen. Suggest that they ask questions about the object such as:

- Is it hard or soft?
- Is it wet or dry?
- Is it cold or warm?
- Is it bumpy or smooth?

Finally, when they have acquired enough information, they may want to make a guess as to what kind of animal the covering comes from.

PURPOSE: *To understand that animal coverings come in a variety of textures.*

ACTIVITY: Using any available materials, ask the children to construct models of these animals to show their unusual coverings:

- echidna
- porcupine
- crocodile
- emu
- elephant
- lizard
- penguin

PURPOSE: *To understand that man has exploited many animals for their coverings.*

ACTIVITY: Discuss with the class examples of man's exploitation of animals for their skins. Examples:

- Ocelot —South America
- Koala, Kangaroo —Australia
- Chinchilla —South America
- Leopard, Ostrich —Africa, Asia
- Crocodile —Asia

After discussion, have each child or small groups of children design a conservation poster for an animal in danger. Included in each poster should be:

- a drawing of the animal
- reasons why it should be conserved
- suggestions of man-made alternatives for its skin.

Colour/Pattern

PURPOSE: *To identify some possible reasons for colour and pattern in animals.*

ACTIVITY: Design an imaginary animal with a colour and/or pattern so that it can do one of the following:

- Conceal itself.
- Attract a mate.
- Frighten off enemies.
- Communicate with others.

Before you begin, you will have to decide:

- where it lives
- what it eats
- what enemies it has.

After the animals have been designed, discuss these points:

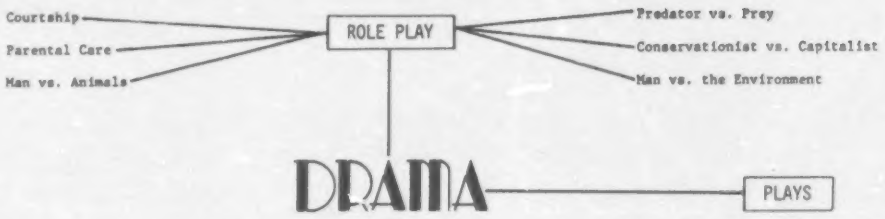
- Does your imaginary animal look like a real animal? Which one?
- Does your imaginary animal use its colour/pattern in the same way as the real animal it looks like?
- Give your imaginary animal an appropriate name.

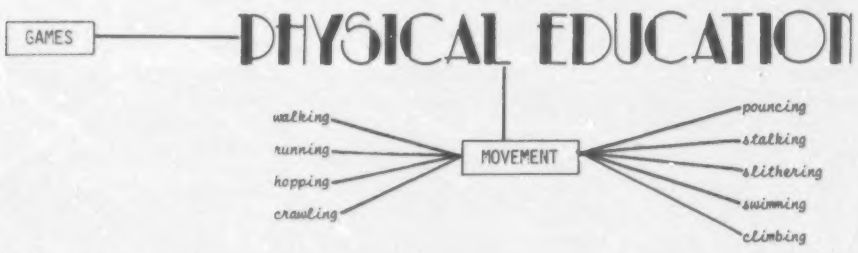
Sounds

PURPOSE: *To show that animals make sounds in different ways.*

ACTIVITY: Take a class walk in the schoolyard or to a nearby park. Tell the children to listen carefully for animal sounds. Ask them to identify each sound/animal. If possible make a tape recording of the sounds they hear.

PHYSICAL EDUCATION/DRAMA—AIMS





Movement

To demonstrate that:

- the way in which animals move is related to their body structure
- an animal shows a variety of forms of movement, to meet different needs
- with the use of technology, man can imitate most forms of animal movement.

Role Play

To point out that:

- role play may aid in clarifying attitudes and values
- role play may help illustrate the complexity of environmental issues
- role play may help to highlight some environmental problems and suggest possible solutions.

PHYSICAL EDUCATION/DRAMA—ACTIVITIES

Movement

PURPOSE: *To show that animals move by pushing against something.*

ACTIVITY: Discuss with the class movement in general. Ask the students such questions as:

- why do animals move
- what helps them to move
- how many different ways of moving can you think of
- what environmental factors influence movement?

Tell the students that in order to move animals must push against something, e.g. a fish pushes its fins against the water. Can the students determine where the push comes from, in the following animals:

- Kangaroo
- Hawk
- Crab
- Worm
- Frog
- Sea turtle
- Jelly fish
- Horse
- Snail
- Shark
- Yabby
- Man
- Crocodile
- Gibbon

PURPOSE: *To illustrate different types of animal movement.*

ACTIVITY: In the schoolyard or local pool, suggest to the children that they try imitating some animal movements. These might include:

LAND ANIMALS	WATER ANIMALS	TREE ANIMALS
kangaroo	tadpole	monkey
horse	hippopotamus	possum

elephant	platypus	tree kangaroo
echidna	fish	goanna
snake	dolphin	koala
emu	penguin	

PURPOSE: *To show jumping/hopping is a specific form of animal movement.*

ACTIVITY: Make a class list of animals that jump/hop. Discuss with the children what these animals have in common. Imitate the movement of the animals you have listed.

Set up a long jump, and make a class chart to show who can jump the longest. Compare the class results with the longest jump of any animal.

A grey kangaroo—13.5 metres.

Set up a high jump, and make a class chart to show who can jump the highest. Compare the class results with the highest jump of any animal.

A dolphin—6 metres.

PURPOSE: *To show that by using machines, man is able to imitate the movements of animals.*

ACTIVITY: Ask the children to supply animals that move like these machines:

- submarine
- bulldozer
- escalator
- helicopter
- swing
- glider
- racing car
- pop-up toaster
- jet
- roller coaster

Can the children think of other machines that imitate animal movements?

PURPOSE: *To demonstrate that body shape has an influence on how an animal moves in its environment.*

ACTIVITY: Discuss with the students the concept of stream-lining. Have the students draw pictures of streamline animals that live in the water.

Some questions for further discussion:

- How does a streamlined body shape help water dwelling animals in their movements?
- Are there any land animals with stream-lined body shapes?
- Name some man-made streamlined things.

PURPOSE: *To show that flying/gliding are specific forms of animal movement.*

ACTIVITY: Have the children make a class list of animals that fly and animals that glide.

A few points to consider:

- What is the difference between flying and gliding?
- What features do flying animals have in common?
- What features do gliding animals have in common?
- Why can't you fly or glide?

Some things to do:

- Have the children draw wing silhouettes of these animals:
  - —eagle
  - —swift
  - —bat
  - —albatross
  - —penguin
  - —sugar glider
- Can all these animals fly?
- Which flies the fastest?

Have the children bring in chicken bones (or any other poultry bones) and rabbit, sheep or cow bones. Ask the children to break open the bones and list the differences they see between the bird and the mammal bones. The children could draw diagrams of what they have found out.

Role Play

PURPOSE: *To convey to students the beauty and complexity of many animal interactions.*

ACTIVITY: Suggest to the students that after some research, they may wish to role play some of the following animal interactions:

- Courtship
  - —the courtship dance of a pair of brolgas
  - —territorial displays and fights between adjacent pairs of seagulls, magpies or willy wagtails
  - —male kangaroos sparring
- Parental care
  - —mother duck and ducklings

—female koala and joey.

—galah parents feeding young.

PURPOSE: *To show that man interacts with animals.*

ACTIVITY: Hold a class discussion to determine some of the ways man interacts with animals. The students could role play the interactions they think of. Here are some suggestions:

- Stranded in the desert you encounter a (deadly snake or scorpion).
- Swimming in the sea (sharks appear, you encounter a box jelly fish).
- Working in your garden you encounter (a redback spider or funnel web spider).

PURPOSE: *To show that role play can be useful in suggesting solutions to environmental problems.*

ACTIVITY: Make a class chart to show the following:

Local environmental problems	State environmental problems	National environmental problems	International environmental problems

Have the children role play an example from each of the four categories.

Here are some suggestions:

- An apartment complex is to be built on your local park.
- A conservationist (from a foreign country) trying to convince a group of native peoples intent on over-exploiting the natural environment to preserve it.
- A logging company has offered your State government millions of dollars for rights to clear fell State forests. Organise a campaign to save the forests.

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